33rd Year APRIL, 1949

RUBBER AGE

CUMATE

IS RECOMMENDED FOR

WIRE INSULATION

and

MOLDED ARTICLES

. . . Use it in GR-S compounds for

SAFE processing, QUICK cures and GOOD aging.

R. T. VANDERBILT CO. INC.

230 Park Avenue, New York 17, N. Y.

IR v.65 April-Sept. 1949

DU PONT ANNOUNCES NEOPRENE TYPE RT

A new, improved general-purpose polymer

RETAINS TACK LONGER

RESISTS VULCANIZATE CRYSTALLIZATION

STABILIZED WITH A NON-DISCOLORING ANTIOXIDANT

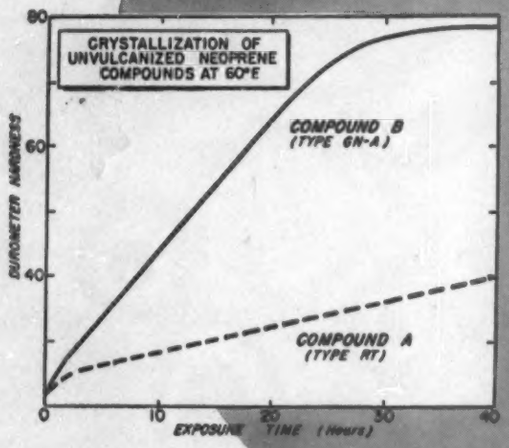

FIGURE 1

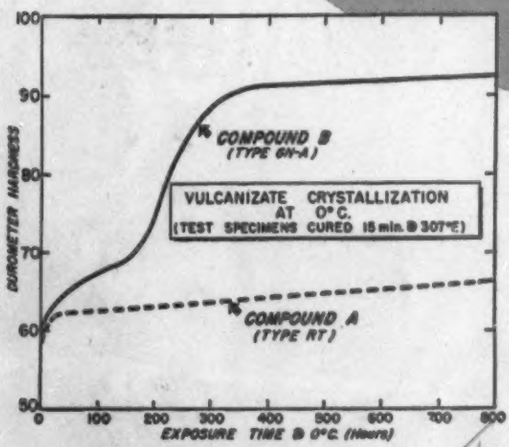

FIGURE 2

COMPOUNDERS will find Neoprene Type RT ideal for friction stocks where its improved tack retention assures excellent ply adhesion. And in roll covering, conveyor cover and sheet stocks, too, it will be found useful. Since Type RT stocks remain pliable, air-trapping during building operations is minimized in these applications.

The stiffening rates of similar Type GN-A and Type RT compounds are compared in Figure I. The retained softness of the Type RT stock correlates well with its improved retention of tack and flexibility.

Vulcanized Type RT stocks, too, resist stiffening even at 0° C.—the critical temperature for crystallization of neoprene. This is shown in Figure 2, which compares the resistance to stiffening of similar Type GN-A and Type RT vulcanizates at 0° C.

Because Type RT contains a non-discoloring antioxidant, it is stable in storage and may be used in stocks where minimum staining or discoloration is required.

Complete information on the use of Neoprene Type RT will be found in Report 49-2. Extra copies are available. Experimental samples on request. Write to:

DU PONT RUBBER CHEMICALS

E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Del.

DU PONT

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THE RUBBER AGE, published monthly by The Palmerton Publishing Co., Inc., Printing Office, East Stroudsburg, Pa. Editorial and Advertising Offices at 250 West 57th Street, New York 19, N. Y. Entered as second class matter October 20. 1933, at the Post Office at East Stroudsburg, Pa., under the Act of March 3, 1879. Subscription in United States, $3.00 a year; Canada, $3.50; Foreign, $4.00. April, 1949, Vol. 65, No. 1.

Proven time-and-money-saver for rubber compounders!

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CHEMICALS

Easy-processing stiffening agent for natural and American rubber products

GOOD-RITE RESIN 50 is the first in a new series of high styrene-butadiene copolymers to be developed by B. F. Goodrich Chemical Company.

Its special purpose is to serve as a stiffening agent. But it offers rubber compounders many extra advantages.

For example, when used in the recommended proportions, Good-rite Resin 50

- **gives higher elongation**
- **improves molding and flow characteristics**
- **saves masterbatching**
- **gives lower brittle point and compression sets**

Resin 50 is made as a white, *free-flowing* powder. Its size is such that it will pass a 100 mesh screen. It can be compounded in a wide range of colors. Added to rubber compounds, it also provides a positive reinforcement and a more readily handled compound—because it acts as a plasticizer at processing temperatures.

Good-rite Resin 50 is recommended for shoe soling compounds, floor tiling —has many other possibilities.

Send for complete information—find out how Good-rite Resin 50 may help you produce better products, easier, at lower cost. Please write Dept. HB-4, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

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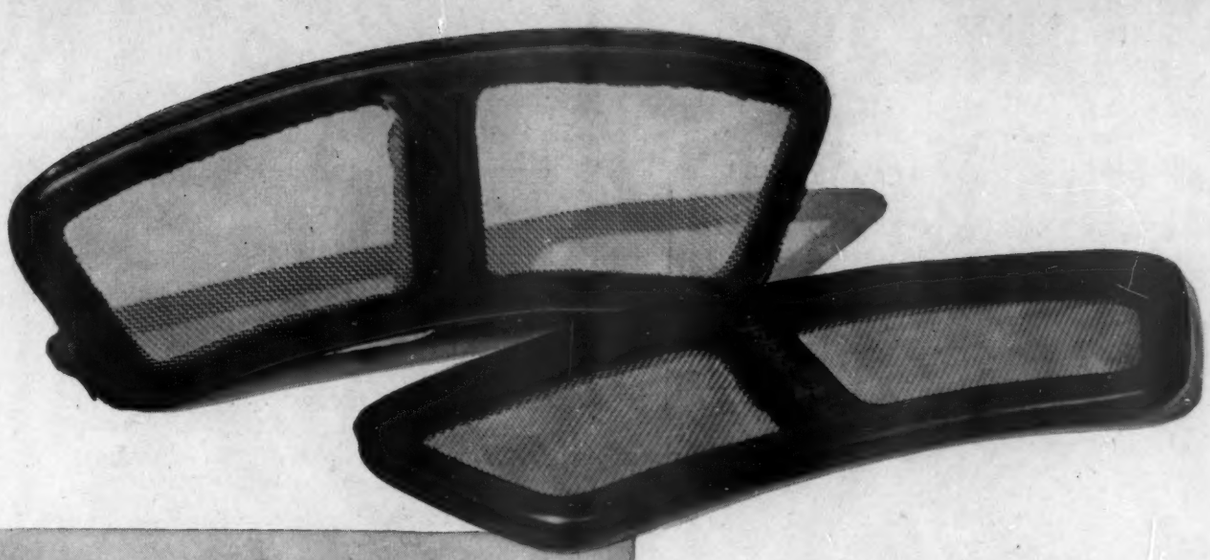


for stiffness that means

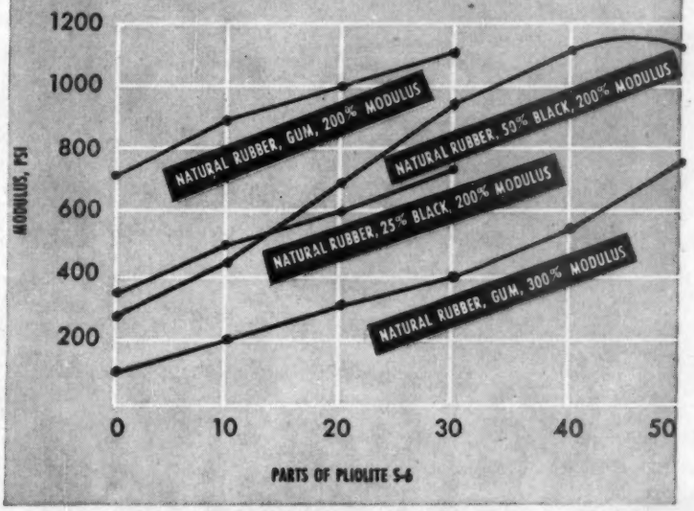
Easier Fabrication
Longer Product Life

Specify

PLIOLITE S-6

EFFECT OF PLIOLITE S-6 ON NATURAL RUBBER

The stiffness of gum and black natural rubber stocks, as measured by 200% modulus, is increased by addition of Pliolite S-6. Gum stock plus 25 parts Pliolite S-6 equals stock with 25 parts black in modulus. Chart shows relative change produced by additional parts of Pliolite S-6.



You can fortify the natural toughness of rubber with the stiffness required for fabrication and longer end-product use by employing **Pliolite S-6** in your compounds. The chart shows how effectively **Pliolite** copolymer resins bring added stiffness required by such fabricated parts as washing machine strainers as well as to many extruded items such as hydraulic and steam hose gaskets and to molded parts in a wide range of sizes and shapes.

Besides adding stiffness, **Pliolite S-6** also increases hardness and tensile. The light color of this resin makes it ideally suited for the reinforcement of light colored stocks. You will find **Pliolite S-6** well suited for all applications needing a light color, low gravity stock of 70 to 100 durometer hardness with good processability and marked moldability.

In addition to reinforcing GR-S rubber as in the item pictured, **Pliolite S-6** can be very effectively used to stiffen, harden and improve the processing of natural, Buna N and Neoprene rubber stocks.

You can get **Pliolite S-6** in a powder for your own mixing, or in master batches. For complete information and sample, write: Goodyear, Chemical Division, Akron 16, Ohio.

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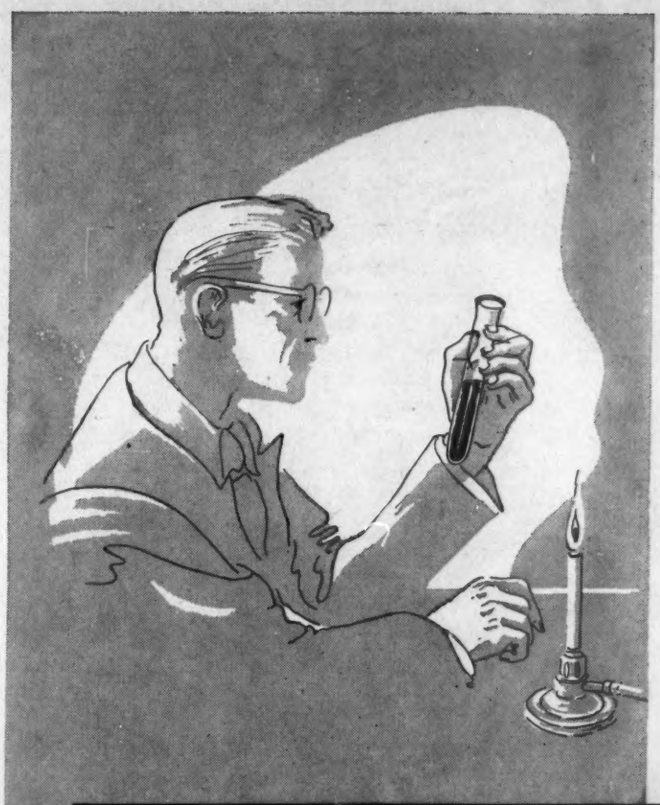
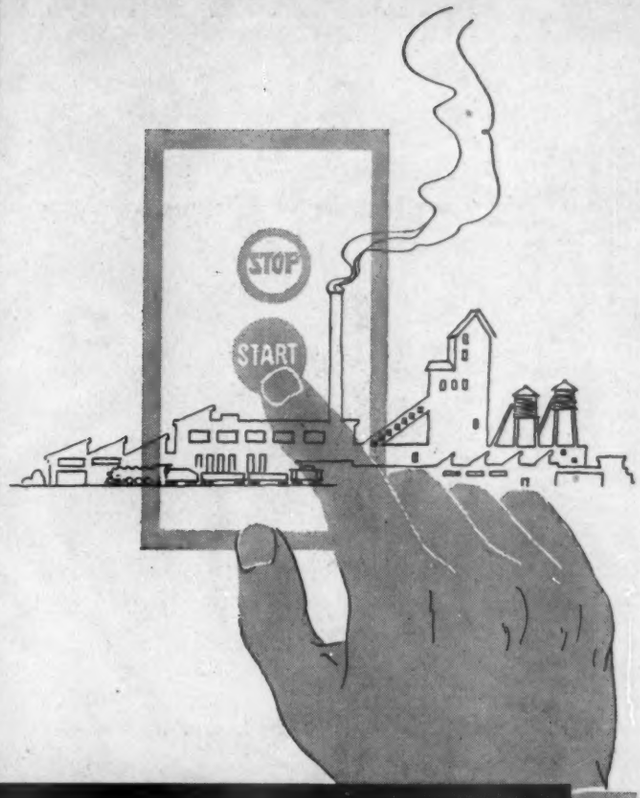
SOLVENTS DIVISION, SKELLY OIL COMPANY, KANSAS CITY, MO.





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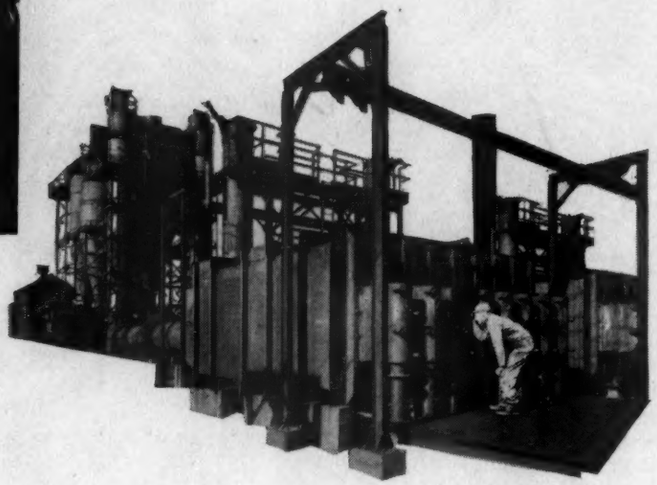
Night and day millions of tiny flames deposit carbon upon steel channels to produce Continental channel blacks.



Carefully controlled burning conditions in furnaces such as these insure uniformly high quality Continex furnace blacks.

Continental Carbon Company manufactures a complete line of high quality carbon blacks to meet the most exacting requirements of the rubber, paint, ink, plastics, paper and other industries. In every important classification of channel or furnace black. there is a Continental or Witco product at your service.

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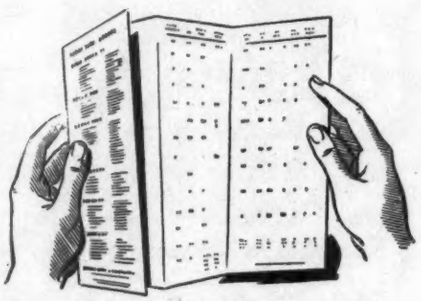
New Data Chart on Continental & Witco Carbon Blacks . . .

Send for the quick reference chart of leading carbon blacks and their important properties. It will save you time and assist you in selecting carbon blacks for your specific requirements.



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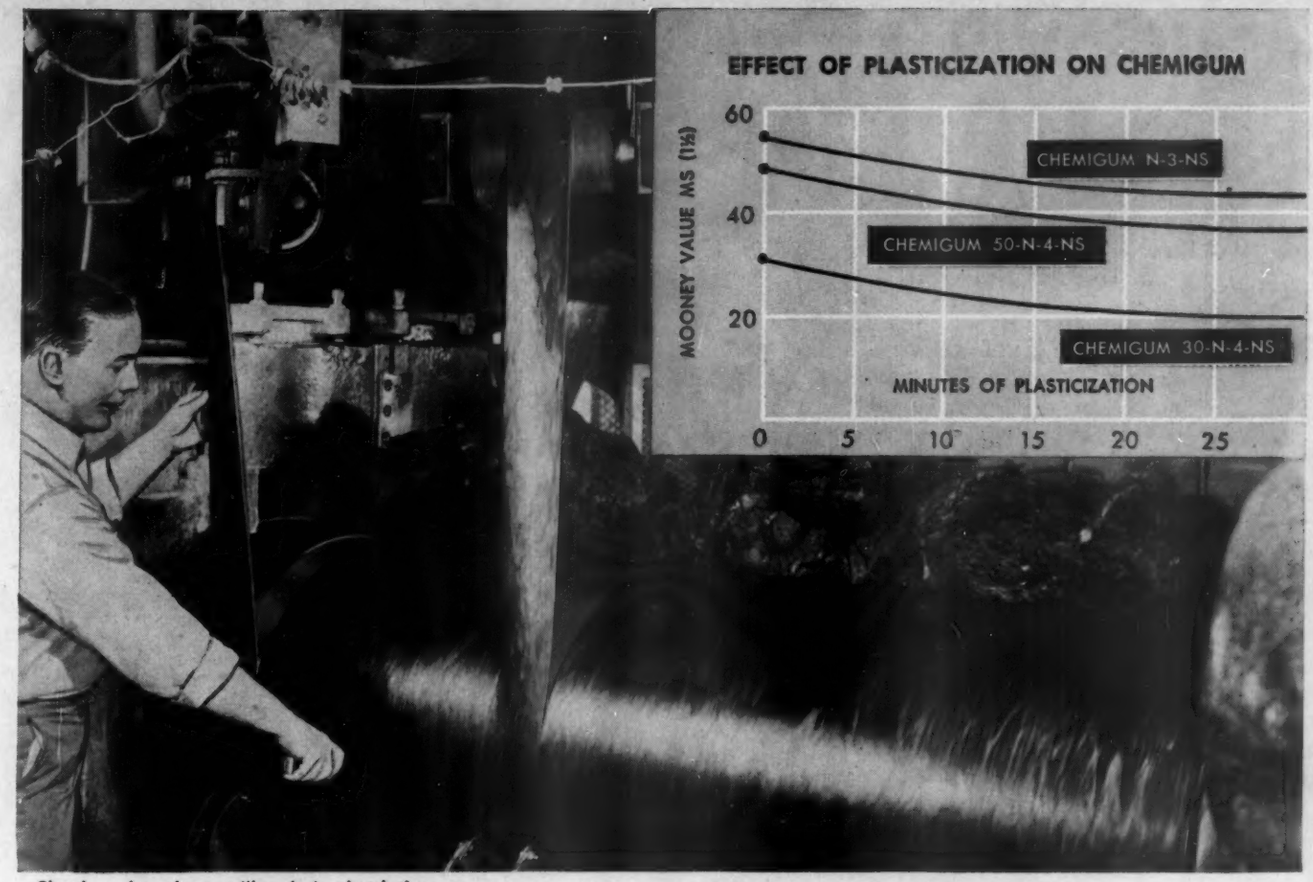

Chemigum is easier to mill, reducing batch time

For easier processing compounds

Use CHEMIGUM

CHEMIGUM oil resistant rubbers give you outstanding processing characteristics. These Goodyear synthetics *do not toughen or harden* with prolonged heat and mastication on a mill or in a Banbury. *They actually tend to soften in processing* — need no special compounding techniques.

In addition to this ease of processing, the **Chemigum** rubbers have all of these unique properties:

EXCELLENT OIL RESISTANCE
LOW SWELL IN AROMATIC SOLVENTS
GOOD PHYSICAL PROPERTIES

They are well stabilized against effects of light and age with non-staining anti-oxidants which permit their use in light-colored stocks.

Chemigum N-3-NS has higher acrylonitrile content, giving it excellent oil resistance and ready processability. **Chemigum 30-N-4-NS** is a softer rubber ideally suited for extrusion, and **Chemigum 50-N-4-NS** is a tougher rubber recommended for molded products. All three forms of **Chemigum** are compatible with vinyl resins and can be used to replace and extend scarce plasticizers. For details, write Goodyear, Chemical Division, Akron 16, Ohio.

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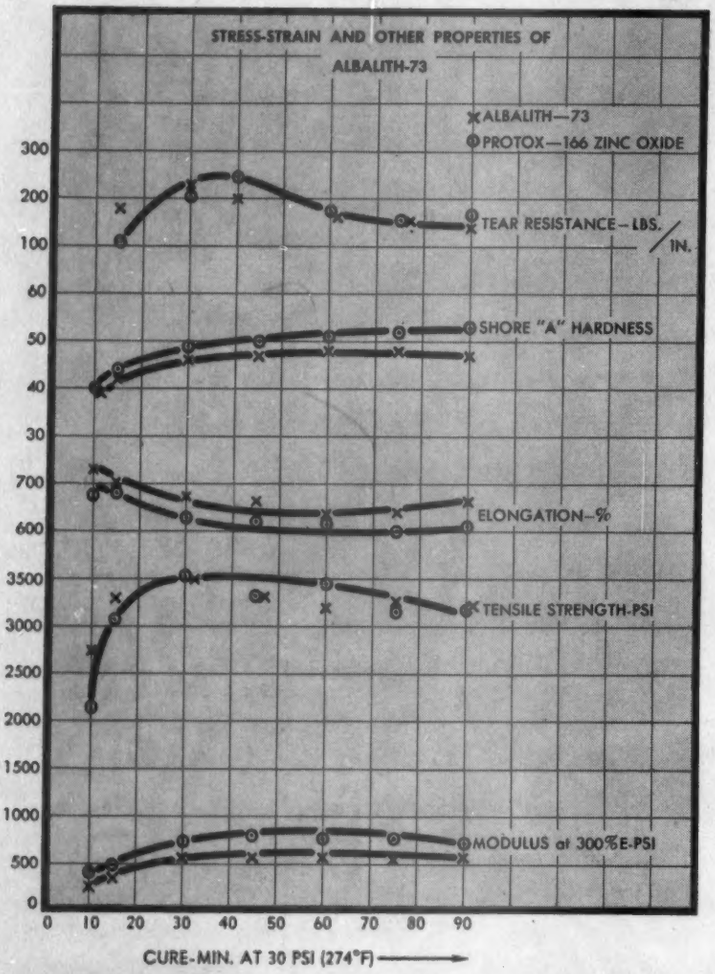
Chemigum (pronounced Kem-e-gum)—T.M. The Goodyear Tire & Rubber Company

AMONG WHITE PIGMENTS

NEW ALBALITH-73

(LITHOPONE)

OUTSTANDING FOR REINFORCEMENT



Place **Albalith-73** in your top group of white pigments for reinforcement — particularly for high tensiles and tear resistance.

Albalith-73 is a special, surface-treated lithopone processed to give better dispersion and fewer aggregates in rubber. Its greater surface area in contact with rubber produces higher tensiles and tear resistance.

Albalith-73 compares favorably with Protox-166 Zinc Oxide*, for example, in tensiles and tear resistance — although it of course does not activate accelerators. See accompanying stress-strain chart.

Compare **Albalith-73** with Zinc Oxide and other white pigments for reinforcement in your compounds now.

COMPOUND

Smoked Sheet	100
Sulfur	3
MBT	1
Agerite Powder	1
Stearic Acid	3
Protox-166	100- 5
Lithopone	0-70.4

U.S. Patents 2,303,329 and 2,303,330

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NOW A PROVED SAVING . . .

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Since CHAMPION pioneered the idea of shipping clay on EXPENDABLE PALLETS a few months ago more than 150 car loads have been delivered to prove the value of this innovation in clay handling . . . Truly this idea assures real economy in the delivery of the fine, uniform light-colored clay that is mined and processed with extra care by the National Kaolin Products Company at Aiken, South Carolina.

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AKRON 8, OHIO
BRANCHES: BOSTON, TRENTON, CHICAGO, LOS ANGELES

This IOI Gas-Fired Latexing Machine Provides Complete One-Man Process Control

SOUND ENGINEERING, rugged construction, compact design, operating economy—these are some of the basic reasons why this IOI latexing machine, shown above from the wind-up end, yields maximum returns on the investment it represents. Typical of its many outstanding features is the completeness of one-man control of the latexing operation which it makes possible.

In operation at the Inland Rubber Corporation, Chicago, this IOI medium-duty, gas-fired unit is currently operating at 28 YPM. Using two large capacity air heaters, it represents the first practical and successful application of gas in a fabric latexing machine.

The same advantages which characterize this machine—superior engineering, and construction, small space requirements and low operating costs—are incorporated in heavy-duty IOI latexing machines designed for operating speeds of 60 YPM and above. Units are for weftless or woven fabric latexing in train with rubber calender or as a separate operation.

For complete information on IOI Coating and Handling Equipment for Textiles, Papers, Films and Foils write for "Blueprint for Industry, Part V"—or an IOI engineer will be glad to call in person if you prefer.

Panelboard of operating control gear which gives operator complete mastery over every phase of the machine's operation. Note safety dials and main DC control. One of the two direct, gas-fired air heaters is at the left.

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ASSOCIATED COMPANY: JAMES DAY MACHINERY LTD., LONDON W.1, ENGLAND

leaves from a Rubber Chemist's notebook

PEPTON 22 PLASTICIZER

Re: PEPTON* 22 PLASTICIZER
(peptizer or catalytic plasticizer)

Recommended for natural rubber or various types of GR-S.

Free flowing powder

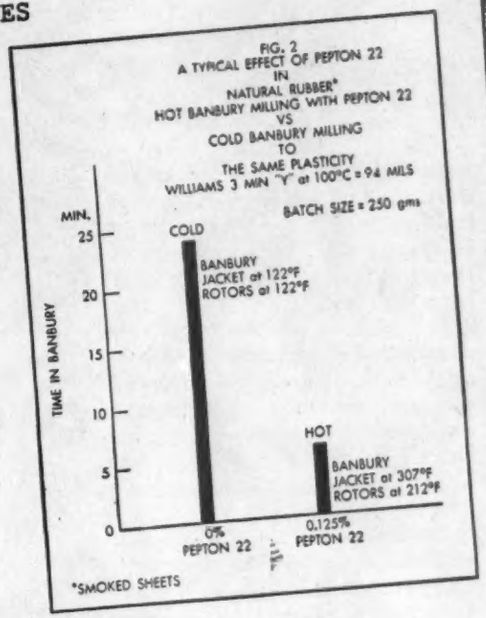
Non staining

Non-toxic

IMPROVES PROCESSING QUALITIES
REDUCES POWER CONSUMPTION

REMARKS:

shows drastic reduction of breakdown time on hot mastication — see chart



RECOMMENDED PERCENTAGES

—for natural rubber, try from about 0.1 to 0.5 parts per 100 parts of rubber, depending on the time, temperature of milling and plasticity desired.

—for GR-S, try about 1.0 to 3.0 parts per 100 parts of GR-S, depending on the time, temperature of milling, plasticity desired and polymer used.

Calco

*Reg. U.S. Pat. Off.

AMERICAN Cyanamid COMPANY

CALCO CHEMICAL DIVISION
RUBBER CHEMICALS DEPARTMENT
BOUND BROOK, NEW JERSEY

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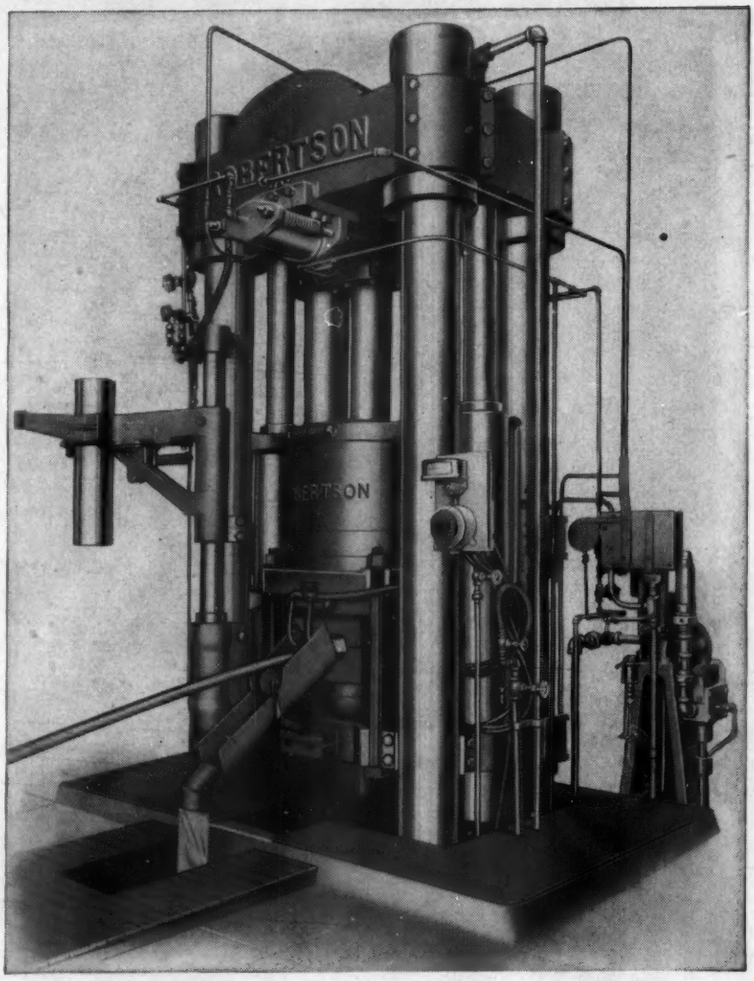

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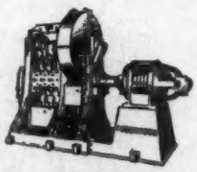
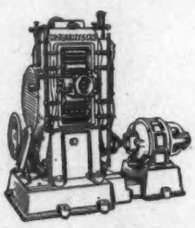


Hydraulic Pump



Lead Sheath Stripping Machine

Open Lead Melting Pot

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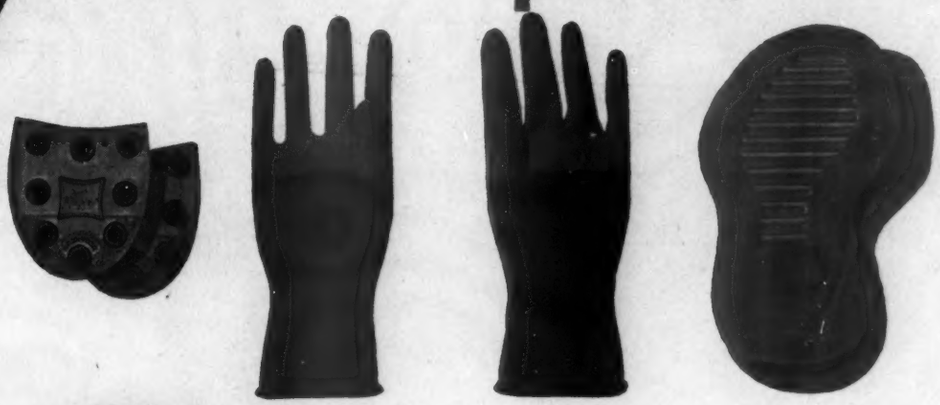
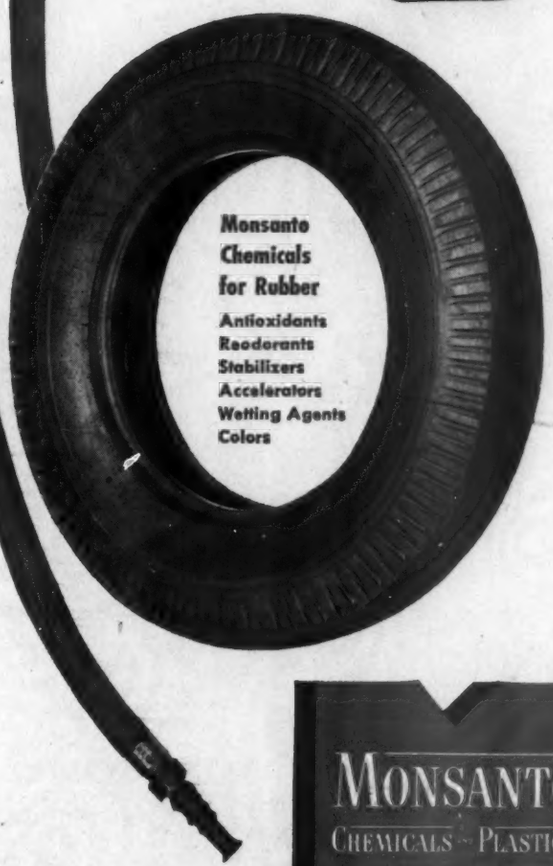
Designers and Builders of all Types of Lead Encasing Machinery

Since 1868

SANTOFLEX B

protects rubber stocks against oxidation and flex cracking





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Stabilizers
Accelerators
Wetting Agents
Colors

Santoflex B provides compounders with dependable protection against oxidation and flex cracking. This vital chemical action will insure superior qualities in a wide variety of finished products... including tires, tubes, hose, heels, soles, belts and many kinds of mechanical goods.

Santoflex B is widely specified by plant men because it melts and flows into rubber stocks—gives uniform dispersion at milling temperatures.

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Santoflex: Reg. U. S. Pat. Off.

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CHEMICALS — PLASTICS

MONSANTO CHEMICAL COMPANY RA-3
Rubber Service Department
Second National Building, Akron 8, Ohio
Please send me further information ( ); prices ( ); samples ( ) of Santoflex B.

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Chemicals you live by

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In plastics, these compounds will increase hardness, improve light stability and scratch resistance.

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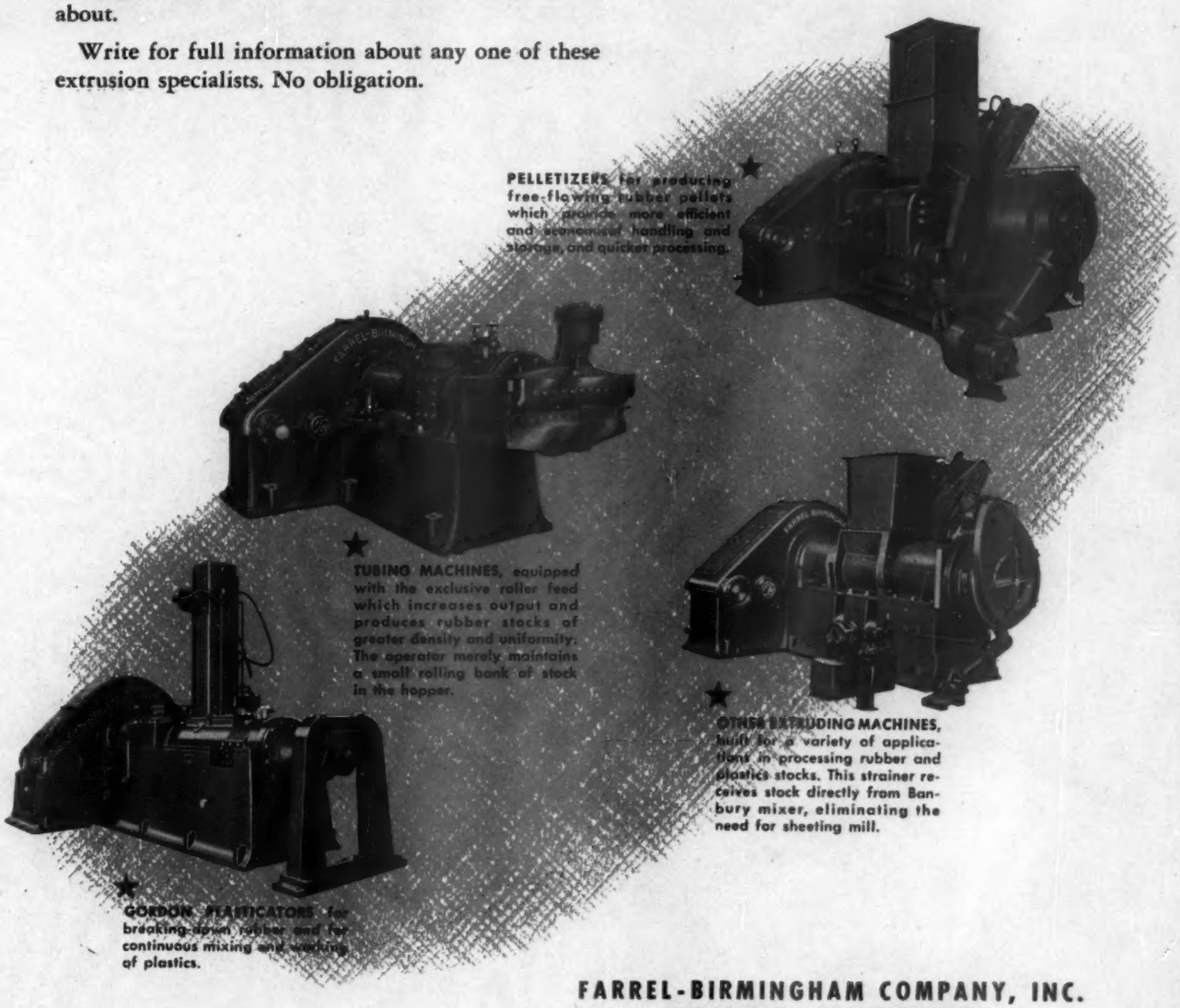
DIAMOND ALKALI CHEMICALS

HERE ARE FOUR TYPES OF EXTRUSION SPECIALISTS you should know about...

Farrel-Birmingham engineers have developed four separate variations of the single basic principle — *mastication and extrusion by screw action.*

Each of these types of machines has been designed to solve one or more specific problems commonly encountered in processing rubber and plastics. Each incorporates exclusive features which increase output, improve product quality and reduce manual handling and supervision. They are machines you should know about.

Write for full information about any one of these extrusion specialists. No obligation.



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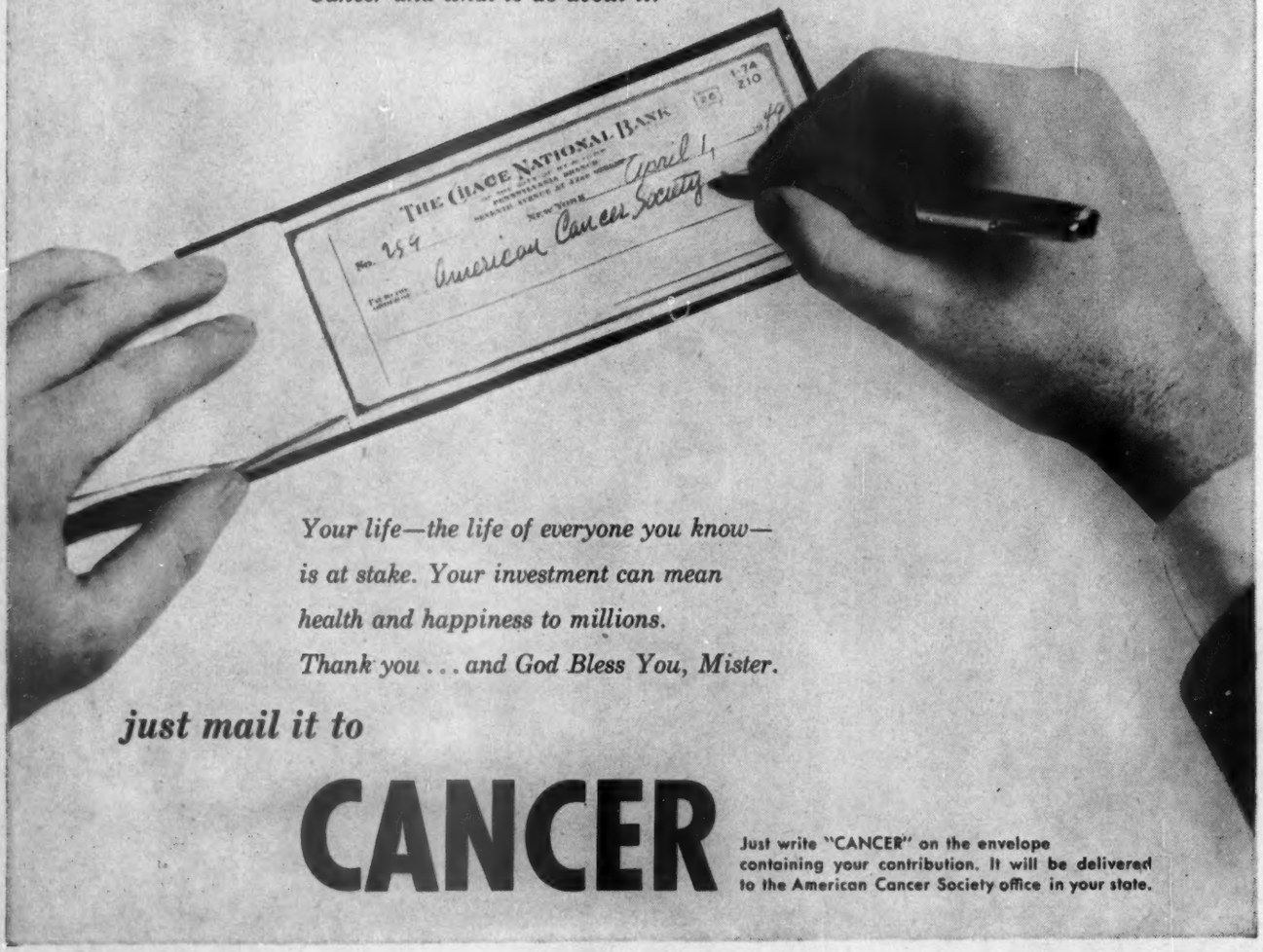

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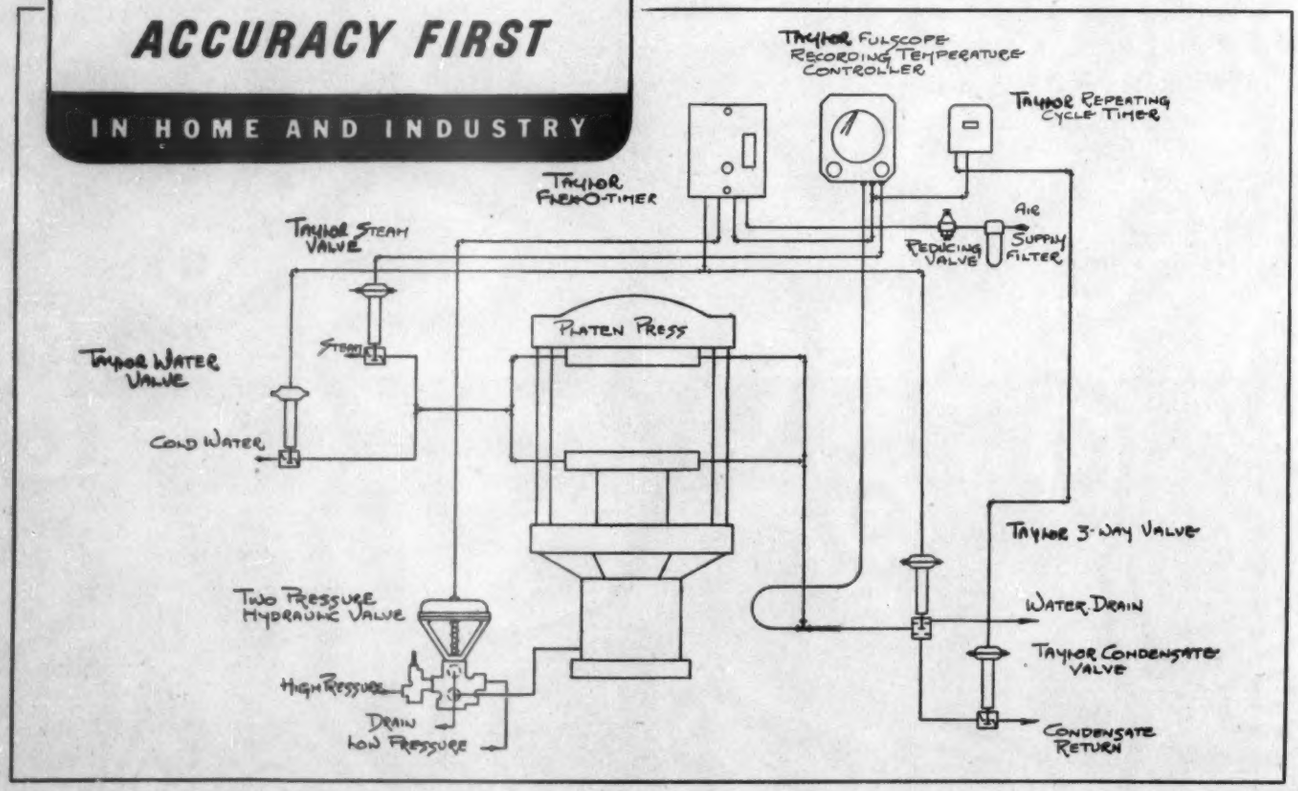

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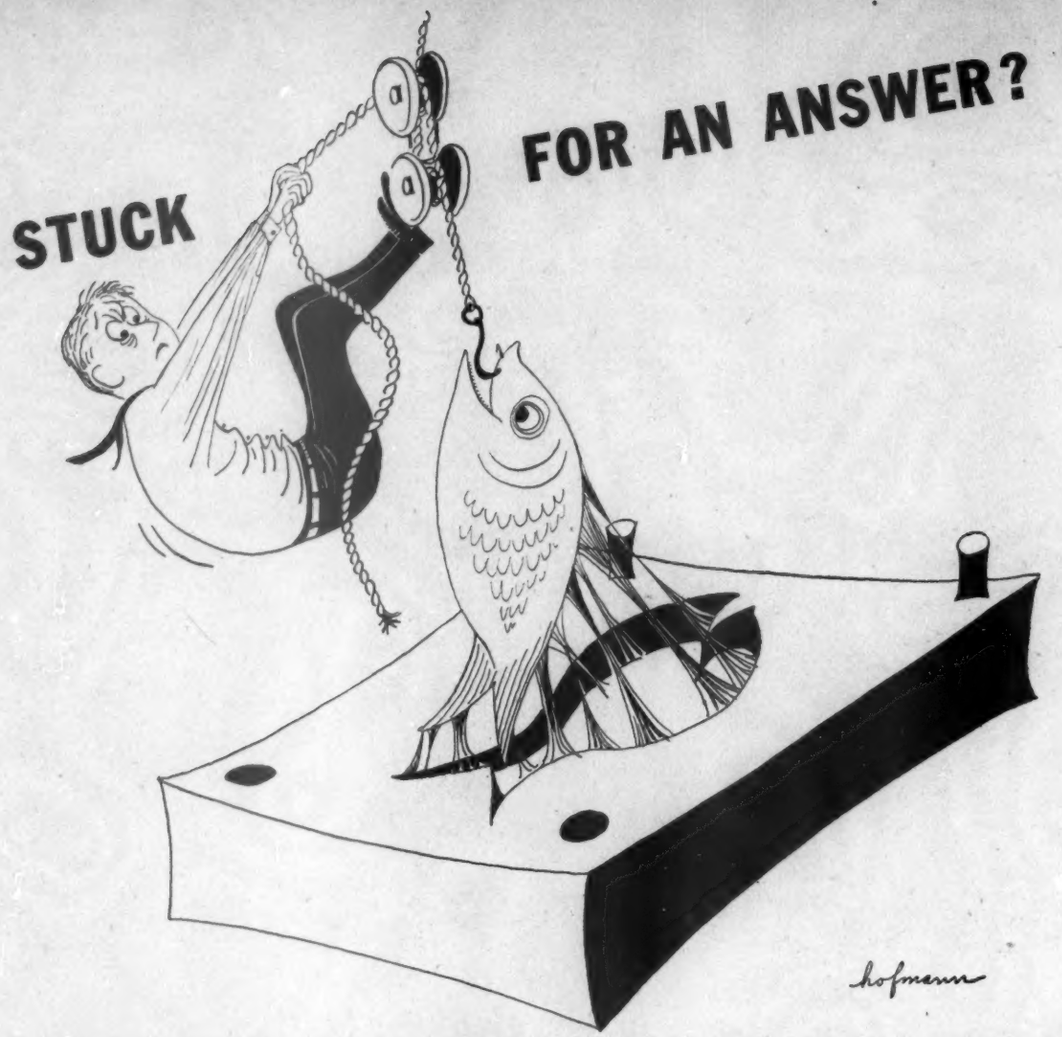

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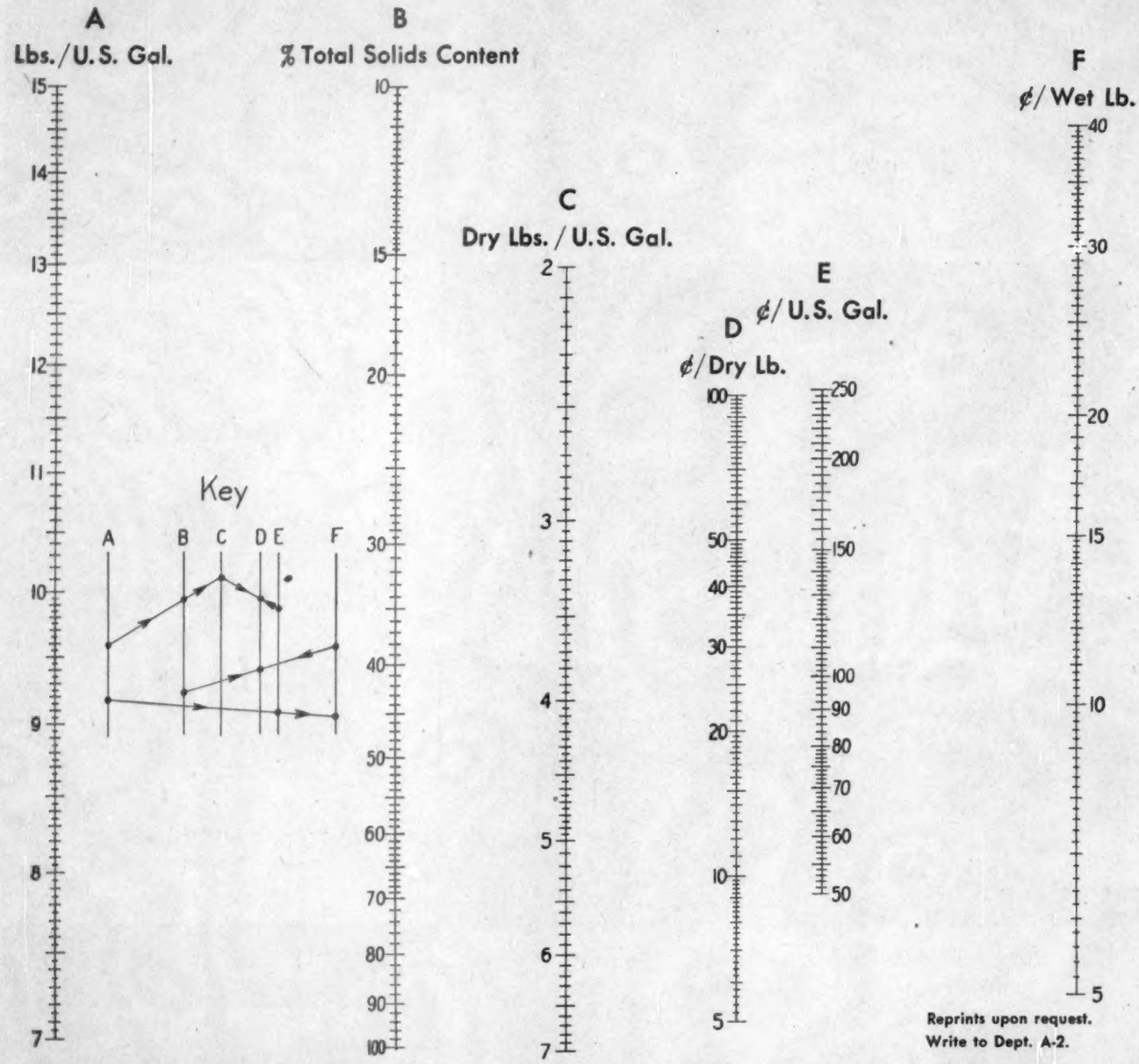

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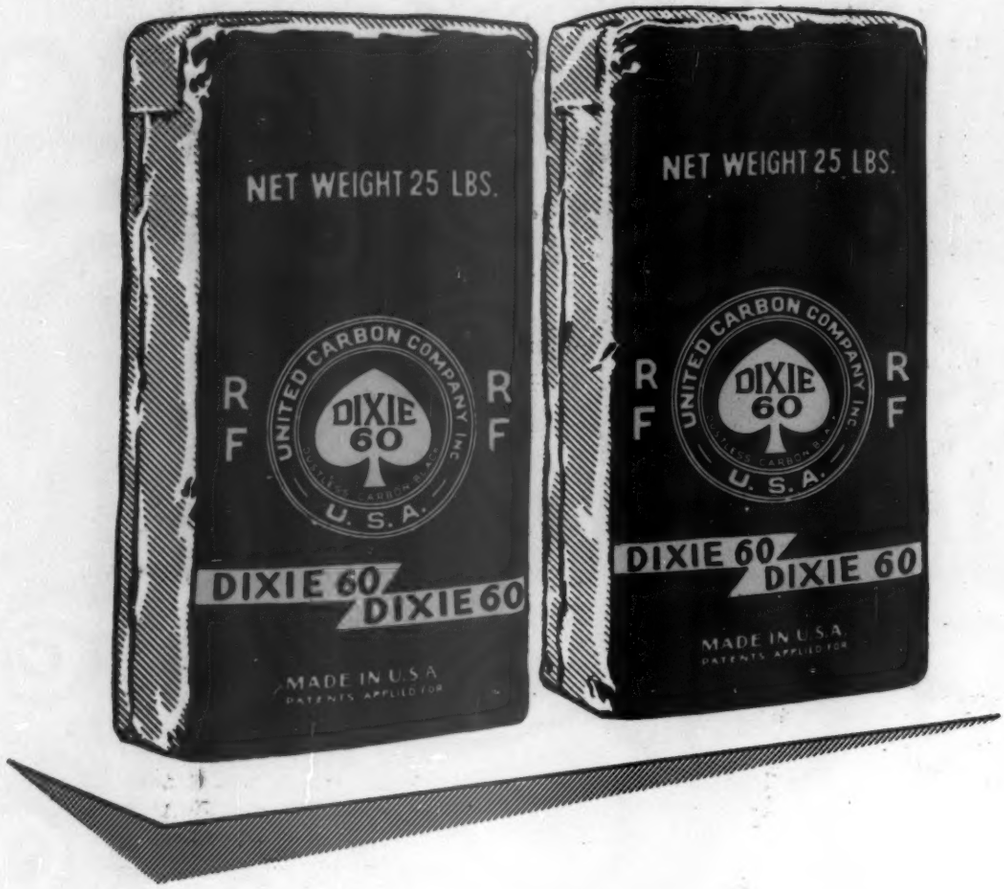

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Low Temperature Performance of Butyl Inner Tubes. *R. J. Adams, E. J. Buckler,* and *G. G. Wanless.*
Preparation and Properties of Buna N Type Copolymers. *J. F. Nelson* and *B. M. Vanderbilt.*
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Alteration of Neoprene by Polymerisation Temperature. *H. W. Walker* and *W. E. Mochel.*

Chemistry of Rubber

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Hydrochlorination of Rubber in Latex. *G. J. van Veersen.*
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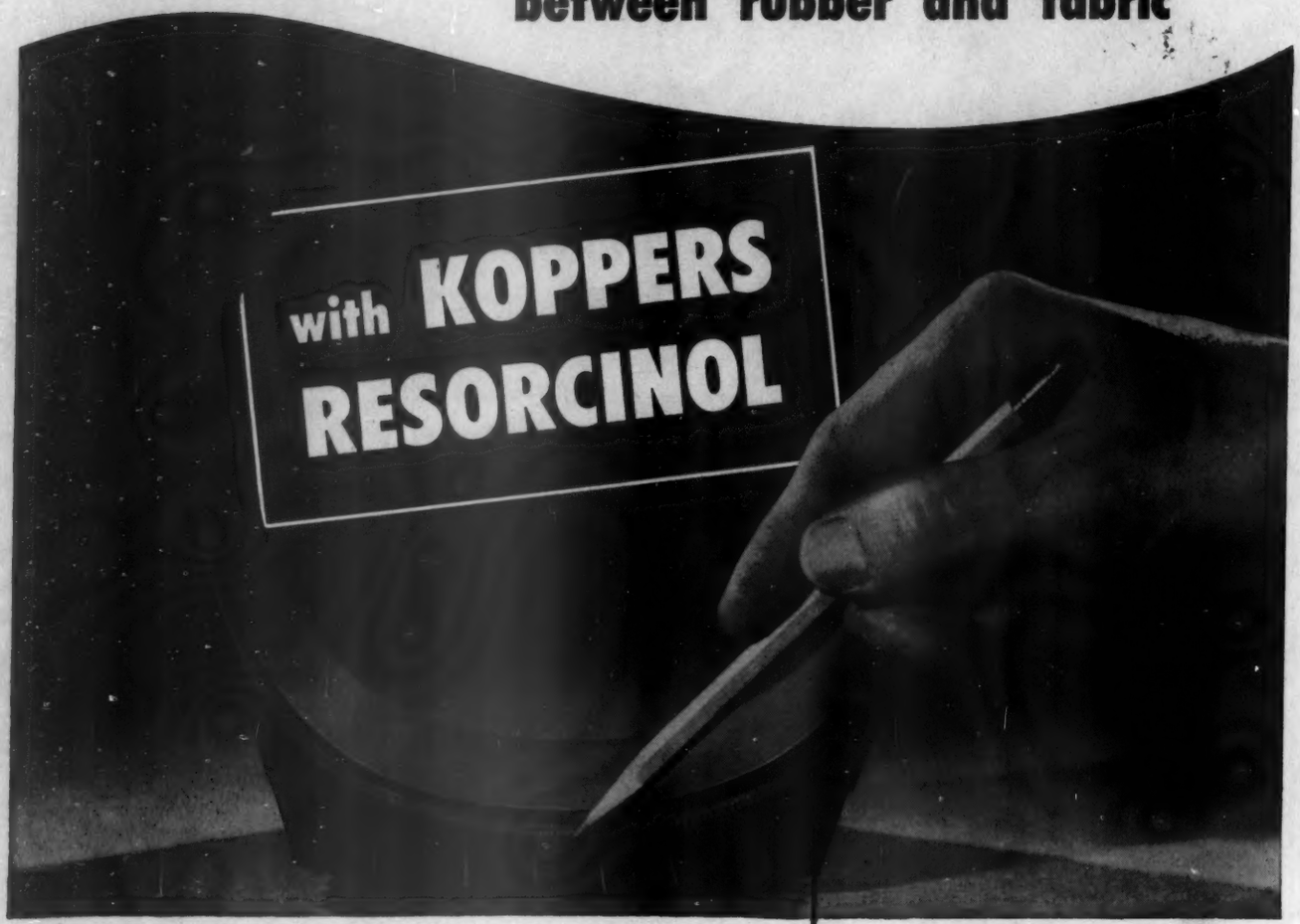

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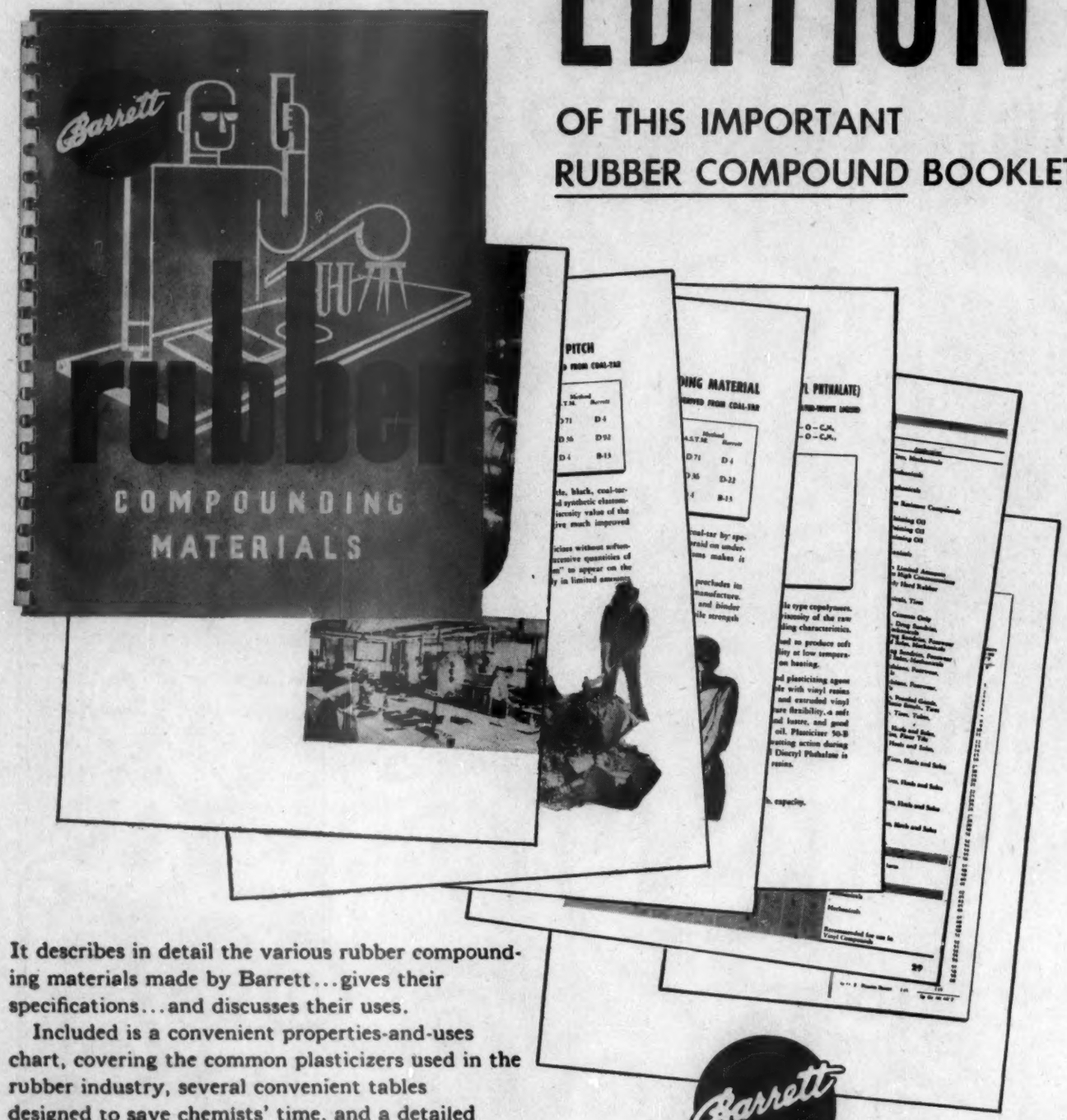

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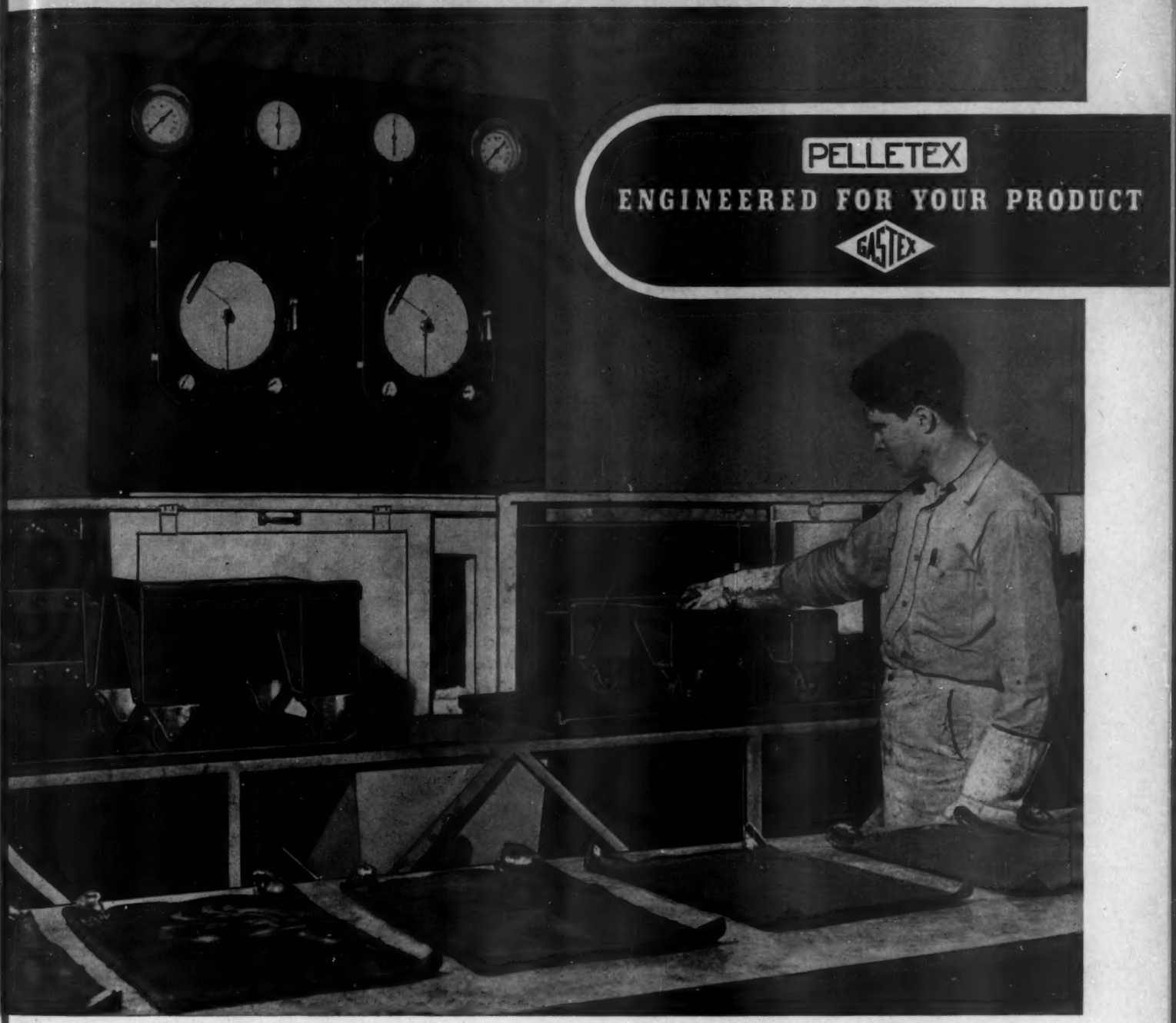

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CONTENTS FOR APRIL, 1949

Processing Characteristics of Neoprene—*By Neil L. Catton* 39

Socfin's Facilities in Malaya 43

Modern Quality Control Applied to Compounding—*By Anthony Oladko* 44

Correction of Unsafe Practices 46

Two 60-Inch Mills Driven by a Single Geared Speed Reducer 46

Panel Discussion on the Application of Industrial Fabrics 47

Impregnation of Leather with Elastomers and Synthetic Resins 52

Division of Rubber Chemistry, A.C.S., Meets in Boston on May 23, 24 and 25 53

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REGULAR DEPARTMENTS

Book Reviews	90	Los Angeles News	78
Canadian News	80	Names in the News	74
Chemical Prices	100	New Equipment	82
Classified Ads	110	New Goods	79
Coming Events	62	Obituaries	81
Editorials	59	Rubber, Cotton Markets	98
Financial News	76	Statistics	*

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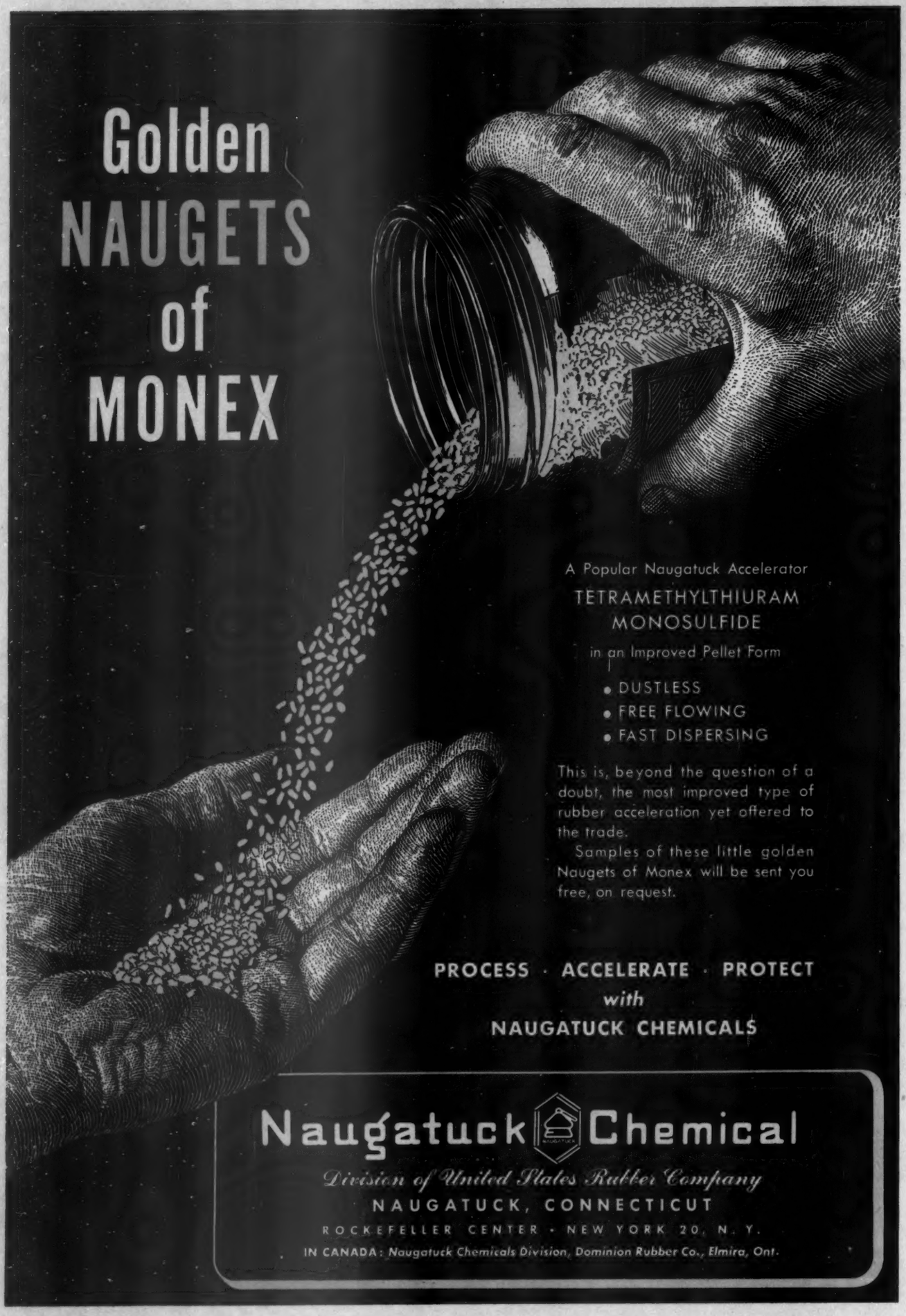

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RUBBER AGE

Vol. 65, No. 1 APRIL, 1949

Processing Characteristics of Neoprene

By NEIL L. CATTON

Rubber Laboratory, E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware

IN the seventeen years since neoprene was introduced as the first synthetic rubber to be offered in a free and competitive market, many improvements have been made in both the product and in its application to industry. During the last eight years neoprene has found such a wide acceptance in so many varied products that it is obvious that rubber technologists are able to process neoprene compounds as easily as they do natural rubber compounds.

This article reviews some of the processing procedures that have enabled the rubber industry to utilize neoprene in the wide variety of products being made today. Its scope is limited to a discussion of the general-purpose neoprenes with emphasis on factory procedures and the operations required to make neoprene products, rather than the principles of compounding the stocks.

Mastication

The most important single rule to follow for the successful processing of neoprene compounds is to carry out the operation as rapidly as possible. More batches have probably been ruined by ill advised attempts to "baby" the batch than for any other single cause. The most important thing with which to be concerned in the mixing of neoprene stocks is the breakdown of the neoprene prior to the addition of the fillers and softeners. Experience has proved that a neoprene stock properly mixed is one that handles well throughout subsequent processing operations. General-purpose neoprenes respond to plasticization or breakdown by milling.

Neoprene, like rubber, is most effectively plasticized by milling on cold mills and by making every effort to keep the temperature of the batch as low as possible. In this way, a maximum amount of work can be done to shred the polymer. As soon as a batch gets hot, and is thermally softened, the shearing action from the mill is greatly reduced and little breakdown takes place. When frictional heat softens the batch, it should be dropped in the pan and cooled. Continued milling of hot neoprene only produces stickiness and is apt to set up conditions which result in scorched batches during subsequent processing.

In view of the widespread use of chemical plasticizers, such as the RPAs, in the breakdown of natural rubber, the question naturally arises whether similar agents are available for the neoprenes. The answer is that many of the dithiocarbamates, such as Accelerator 552, are effective plasticizers for the general-purpose neoprenes. However, experience has shown that they are seldom required with present-day polymers. Their use is generally restricted to stocks containing very large quantities of fillers or where subsequent operations require a very soft stock. A serious drawback to the general use of these chemical plasticizers is that they will soften the batch but they will not greatly reduce the "nerve."

Mill Mixing

In mill mixing, the magnesia should be added as soon as the neoprene is broken down sufficiently to make a rough band on the mill. As the magnesia is worked in, the band will improve; and, as soon as it is strong enough, some carbon black or clay should be added to produce a smooth running band. Once this is done, the antioxidants, colors, retarders, and remainder of the fillers and softeners should be added as rapidly as the batch will take them. During the mixing operation, care should be used to avoid building up excessive heat. Lubricants, such as petrolatum, stearic acid, and palm oil, should be added a little at a time to prevent the batch from sticking to the mill rolls. It is well to break the batch loose from the roll while working in some of this type of material. If this is done, little sticking will be encountered with most batches.

Where high quality stocks are being mixed, the dry fillers, especially carbon blacks, should be dispersed in

Note: This article is based on a talk delivered by the author before the Connecticut Rubber Group, Bridgeport, Conn., February 11, 1949.

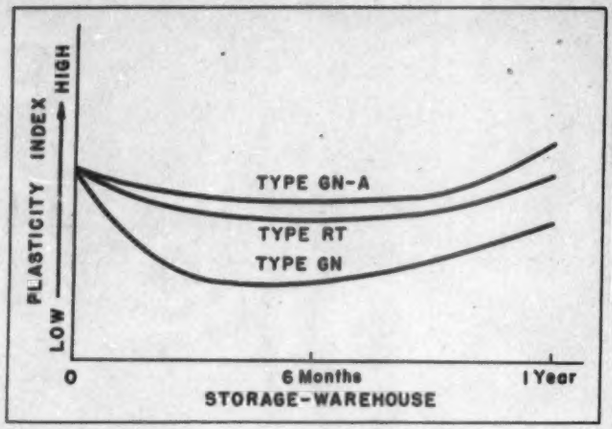


FIG. 1—Effect of storage on plasticity of neoprene.

the neoprene before excessive quantities of oils are added; otherwise, it is very difficult to obtain good dispersion, and lower physical properties will result. If the batch contains soft carbon black or a mineral filler in addition to a hard carbon black, the latter should be added first, properly dispersed, and then the soft carbon blacks and/or mineral fillers added together with the oils. In this way, the incorporation of the oils is speeded up and proper mixing temperatures are maintained.

Banbury Mixing

When using the Banbury mixer for breakdown of neoprene, the same basic principle of cold mastication applies. In practice this means that a full stream of cold water should be turned onto both the rotors and the shell to keep the Banbury mixer as cool as possible. It is important to use a full Banbury charge to get maximum ram pressure and to establish a short cycle. Generally, four to five minutes is satisfactory. After such a breakdown, the neoprene will be somewhat nervy; it should be creped out on the mill and allowed to cool. When replaced in the mixer, the neoprene will soften sufficiently in about one minute so that the compounding ingredients may be added.

Using the conventional method of mixing, the magnesia, retarders, antoxidants, and part of the dry fillers should be added. As soon as the batch has "made up," the remaining dry fillers and softeners are generally added. Accelerators and zinc oxide should be added about 1 to 1½ minutes before dumping. For No. 11 Banbury mixers, 440 to 475 lbs. of neoprene makes a good batch for breakdown and 460 to 500 lbs. is generally about right for a tread type batch. Most neoprene stocks can be mixed in 10 to 15 minutes and dumped without exceeding a temperature of 250° to 270° F.

Some rubber technologists prefer the "upside down" method of Banbury mixing because this method fills the mixer to capacity so that effective mixing starts as soon as the ram is lowered. This technique generally results in faster, lower temperature mixes which are always desirable.

Controlling Uncured Stiffness with Types

One of the more troublesome problems encountered with the processing of neoprene stocks is the softness that results when large quantities of oils are added to produce low hardness vulcanizates. An adequate solution to this problem consists of blending Neoprene Type S with Type GN-A to produce a firmer, tougher matrix capable of absorbing and holding higher quantities of oil without producing excessive softness. Field experience has proved that perfectly homogeneous blends of general-purpose neoprenes with the tougher Type S can be made easily on mills or in Banbury mixers by simply adding together the Type S and the other neoprene, letting them break down at the same time. In making these blends in Banbury mixers all the neoprene should be added together, the ram lowered, and the batch broken down for 5 or 6 minutes. Poor dispersion of Type S will result if it is added to a general-purpose neoprene which has been plasticized. Unless the Type S is properly dispersed, none of the desired stiffening is obtained.

Throughout this discussion the necessity for keeping the batch cool has been stressed. There is a good reason for this. Neoprene is capable of curing at any temperature above room temperature, if given a sufficiently long exposure. Therefore, the total heat history of any batch, i.e., the total amount of heat to which a batch has been subjected, will determine whether or not it is going to scorch in the tube machine or on the calender. As has already been pointed out, a properly mixed neoprene batch will almost always handle well during subsequent operations; so, the importance of proper mixing cannot be over-emphasized.

Extrusion

Most rubber technologists are familiar with the fact that neoprene compounds, in general, extrude exceptionally well. Experience has shown that best results are obtained by using a cold barrel and screw, a warm head, and a hot die. Under these conditions a minimum of scorching trouble is encountered. Unlike rubber, neoprene stocks should never be allowed to "ride" on the warm up mill, but are best "warmed up" by giving them a short, vigorous milling. They should then be removed from the mill and stored in a liner or in a book until used at the tube machine or calender.

Calendering

The successful calendering of neoprene stocks probably requires more attention than any other processing operation encountered in the factory. Neoprene stocks are more temperature sensitive than similar rubber compounds, making it necessary to provide closer control over the surface temperatures of the rolls. Characteristic of most neoprene stocks is the fact that at temperatures between approximately 160° F. and 200° F. they have a tendency to become granular and, under these conditions, break and tend to go to both rolls. At temperatures outside this range these stocks will smooth out and calender satisfactorily. Wherever it is possible to calender at temperatures below the granular stage, it is recommended. However, the higher roll temperatures are preferred for fine calendering of high quality stocks.

Neoprene stocks should be cooled promptly after calendering and, wherever feasible, rerolling is advocated. The temperature range over which neoprene friction and skim stocks work satisfactorily is somewhat narrower than that for rubber or GR-S. However, on calenders where good temperature control is easily obtained, neoprene stocks friction satisfactorily. Where temperature control is inadequate, the use of small quantities of rubber or GR-S added to the neoprene stock will broaden the temperature range over which good frictioning or skim coating can be obtained. Generally, 5 to 10% of these other elastomers is sufficient to make a definite improvement. Soft neoprene stocks have a tendency to stick to liners, and to avoid such trouble, the use of treated liners is recommended.

Molding and Curing

Neoprene stocks may be handled in the same kind of molds that are commonly used for rubber stocks. However, because neoprene softens at a lower temperature than rubber, care should be exercised to see that the stock is thoroughly cold and firm before placing it in the molds. The molds should be closed rapidly so as to obtain maximum flow before the stock becomes soft and loses all its back pressure. The linear shrinkage of neoprene stocks on molding is a little less than that of either natural rubber or GR-S. However, it is generally safe in designing molds to allow 1.5% for shrinkage. This allows the molds to be used with any of the elastomers.

Of course, the higher the curing temperature, the greater the shrinkage. At high curing temperatures most stocks also develop high internal pressures which sometimes cause backrinding when the pressure is released. Practical ways of controlling backrinding are to increase the filler content or to reduce the curing temperature. Semi-entering type molds are beneficial since with this type the pressure can be controlled until the cured part has expanded and the pressure is relieved.

In general, neoprene stocks may be cured at higher temperatures than rubber stocks. Consequently, the overall press time may be reduced to approximate that commonly used with rubber. Steam pressures up to 100 psi are recommended for most molded goods. For low set stocks a minimum cure of 40′/307° F., or the equivalent, for laboratory press sheets is recommended.

Storage Stability of General-Purpose Neoprenes

Although most of the factory problems encountered with neoprene are due to a violation of the principles already discussed, a certain number of them are due to changes which may take place in the polymer itself during warehouse storage. Such changes are most noticeable with Type GN and are markedly accelerated when the storage temperatures are allowed to go above about 70° F. Studies of this problem in our laboratories resulted in 1944 in the introduction of a more stable neoprene, Type GN-A. This neoprene contains a secondary aromatic amine stabilizer and, of course, non-black products made from Type GN-A are subject to typical brown discoloration when exposed to light. Continued study of this problem has recently resulted in the development of a stabilizer which does not contribute to light discoloration and which imparts to neoprene storage stability approximately equal to that of Type GN-A.

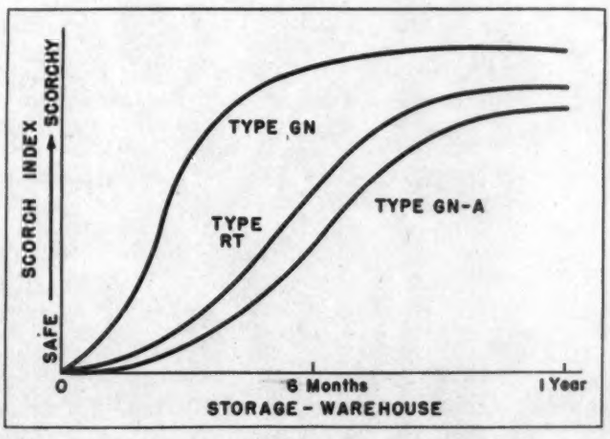


FIG. 2—Effect of storage on scorch of neoprene.

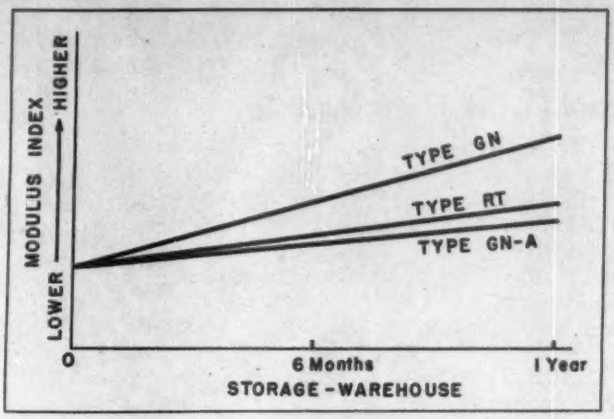


FIG. 3—Effect of storage on cure rate of neoprene.

This stabilizer is being used in the new, non-crystallizable, general-purpose neoprene, Type RT.

Investigations have been made of the changes which take place in the properties of general-purpose neoprenes during extended storage. The properties studied were plasticity, scorching tendency and rate of cure. The storage conditions were chosen to exaggerate warehouse storage by using a temperature of 80° F. which is somewhat higher than that prevailing in normal storage.

Changes in plasticity, as shown by Williams plasticity number and Mooney viscosity number, were determined on specimens of these neoprenes stored for periods up to one year. Results of this study are shown in Figure 1. The curves show that there is softening of Neoprene Type GN during the first two to three months following its manufacture, after which time it remains at about the same plasticity for several months and then gradually begins to get tougher. Neoprene Type GN-A, however, is a marked improvement, in that the change in plasticity is much less over the entire storage period. The storage stability of Type RT approaches that of Type GN-A.

Mooney scorch time at 250° F. or modulus after 227° F. cures are the most common measurements used to determine processing safety. Either of these could be used as a scorch index. In Figure 2, such a scorch index is plotted against time of warehouse storage. Neoprene Type GN becomes considerably more scorchy as the storage time increases, especially after the first month or six weeks. Neoprene Types GN-A and RT, however, are sufficiently stable so that no scorching problems should be encountered as a result of average warehouse storage. As neoprene becomes older, greater care must be used to assure cool mixing if scorching is to be avoided.

As would be expected from a consideration of the scorch behavior, Neoprene Type GN, during warehouse storage, increases in rate of cure more rapidly than does either of the others. This is illustrated in Figure 3 where a modulus index, based on a 10′/60 psi cure of a gum neoprene stock, is plotted against time of warehouse storage.

Consideration of the changes in scorch characteristics which take place during storage of neoprene makes more understandable the troubles which may be encountered in working with over-age Neoprene Type GN. All things considered, Types GN-A and RT represent marked improvements over Neoprene Type GN in respect to storage stability and scorchiness. For this reason Type GN-A is recommended for the majority of mechanical goods uses where the discoloration from this polymer is not objectionable. For light colored and

nondiscoloring products, Neoprene Type RT is preferred.

Retention of Tack and Uncured Flexibility

All rubber technologists have at one time or another been plagued with processing difficulties resulting from the loss of building tack in their stocks. These difficulties are usually restricted to products involving extensive building operations and, in general, neoprene stocks have caused more difficulty than natural rubber stocks. With neoprene stocks the evidence indicates that this loss of building tack is closely associated with the phenomenon of crystallization. This effect results in a substantial increase in the stiffness of elastomeric compounds without subjecting them to abnormally low temperatures. This increase in stiffness has been found to correlate well with loss of tack.

This stiffening effect may be studied by observing the changes in Shore hardness of uncured neoprene compounds. Results of such a study are shown in Figure 4 for uncured neoprene stocks stored at 60° F. for periods up to 15 days. The base stock contains 40 volumes of medium thermal carbon black in addition to magnesia, zinc oxide, and antioxidant. In the case of the Type GN stock containing no plasticizer, stiffening takes place reaching a maximum in 24 to 36 hours after which there is little further change. It has frozen. The addition of either light process oil or an ester plasticizer has no effect upon this type of stiffening. They merely lower the hardness of the stock. It is apparent from the curve that the Neoprene Type RT stock containing no plasticizer has not stiffened after a week's storage, then slight stiffening takes place which is not of sufficient magnitude to cause any practical trouble in production. In addition to having resistance to hardening and stiffening, Neoprene Type RT stocks retain their tack characteristics exceptionally well, which makes this type of neoprene particularly suited for frictions and skim coatings.

Further studies have disclosed that the addition of a polymeric softener, such as Para-Flux, to a Neoprene Type GN or GN-A stock will also retard this stiffening and improve tack retention. The use of 5 to 15 parts of Para-Flux in place of the other softeners normally used in a stock makes neoprene compounds resistant to freezing in the uncured state. The Type GN stock containing Para-Flux (Figure 4) has increased in hardness no more than 10 points during 15 days' storage at 60° F. The use of Neoprene Type RT compounded with Para-Flux is recommended for maximum resistance to this type of hardening. Of course, there are

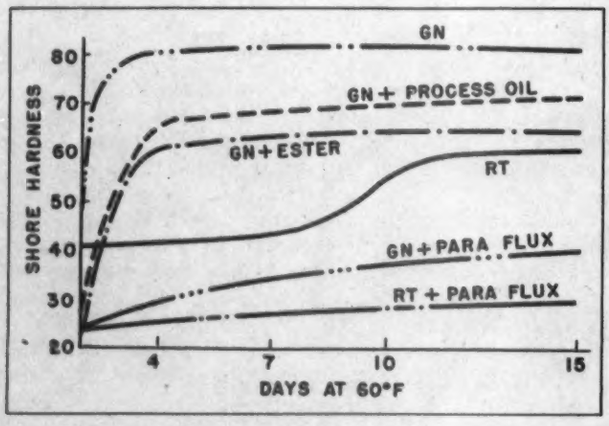


FIG. 4—Stiffening of uncured neoprene compounds.

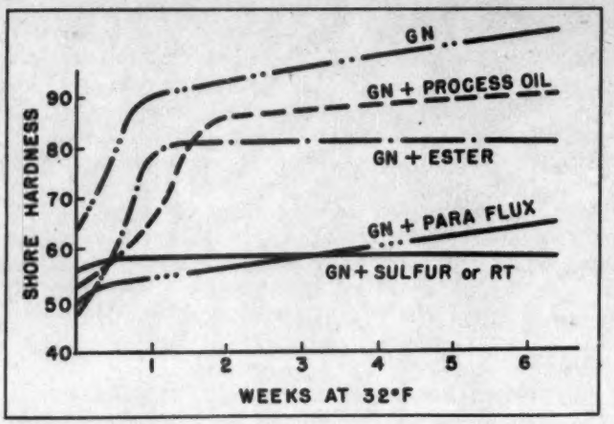


FIG. 5—Crystallization of neoprene vulcanizates.

many cases where the normal stiffening of neoprene stocks is a definite advantage, such as in increasing back-pressure for molding and in providing stiffness in tubes for braided hose manufacture.

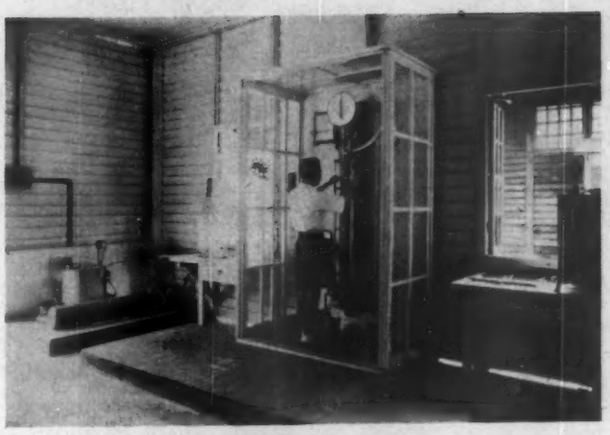
The effects of crystallization on cured elastomeric products are evident as an increase in hardness with time without subjecting them to abnormally low temperature. It is a time effect and it is a reversible reaction. Figure 5 shows durometer hardness plotted against exposure time at 32° F., for these same neoprene stocks after vulcanization. These tests were made at 32° F., since considerable research has indicated that at this temperature crystallization takes place most rapidly. It will be noted that the Neoprene Type GN stock containing no plasticizer crystallized within 5 or 6 days at which time it had reached a hardness of over 90. A Neoprene Type GN stock containing 15 parts of light process oil was softer initially and resisted crystallization for about 3 or 4 days, after which it increased in hardness quite rapidly, leveling off at a hardness of approximately 85.

Ester plasticizers have little or no effect upon crystallization and, like the process oil, they merely act as softeners to reduce the cured hardness. There is, however, another type of stiffening due to cold alone, wherein these ester plasticizers are very helpful. That is the amorphous stiffening that results as soon as low temperature equilibrium is established. Ester plasticizers assist materially in preventing hardening of this type and they are also helpful in lowering the brittle point of neoprene vulcanizates.

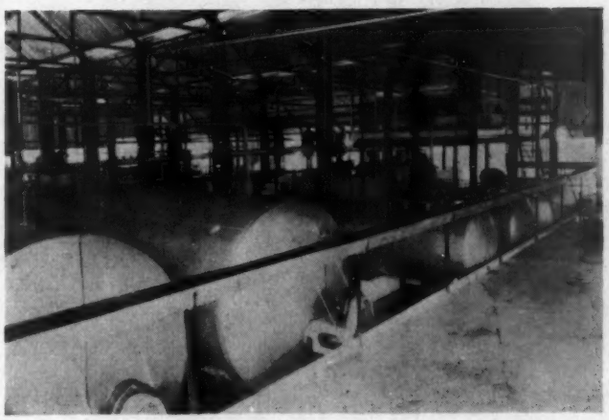
The curve for the Neoprene Type GN stock containing 15 parts of Para-Flux shows amorphous stiffening occurring within the first minutes of exposure after which there is no great increase in hardness which would denote crystallization. The line which is approximately parallel to the ordinate shows the change in hardness to be expected either from a non-crystallizable Neoprene Type RT stock or a Type GN stock containing Para-Flux and cured with sulfur. Considerable information has been published regarding sulfur vulcanization of neoprene showing how this retards crystallization of Neoprene Type GN or GN-A compositions. While such compositions do resist crystallization to a very marked degree, they are somewhat limited because of the extra curing time required. Wherever the slight hardening of a Type GN or GN-A stock containing Para-Flux is acceptable, this is the most economical means of controlling crystallization. Neoprene Type RT is recommended for those jobs where maximum resistance to crystallization is necessary.

Socfin's Facilities in Malaya

THE Socfin Company, Ltd., of Malaya, part of the large agricultural and financial interests of Societe Financiers des Caoutchoucs, is one of the world's leading producers of natural rubber. The Malayan company has converted its solid rubber output into "specialized types" and has brought large rubber acreages into liquid latex production. Since the war, the company has spent over $1,000,000 in special latex facilities. While the bulk of the latex production is in the form of high quality centrifuged concentrate, the company also produces creamed, multipurified and concentrated types. The latices are sold under the trade name of "Soctex" while the first of the specialized dry rubbers is known as "Plastorub." As indicated by the photographs herewith, Socfin maintains extensive facilities in Malaya to assure the quality of its products. Both Soctex and Plastorub are distributed in the United States by Latex Distributors, Inc., of Baltimore and New York.

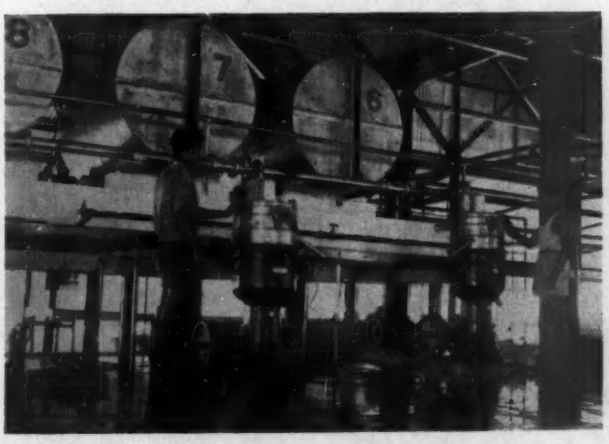


A native technician at work on the Scott Tester in the Socfin laboratory at Kuala Lumpur. Also shown are a Dufraisse Monometer, and an oxygen bomb.



General view of the Bungsar Estate latex factory in Selangor, near Port Swettenham, Malaya, which produces centrifuged latex. Storage tanks are pictured to the left, collection tanks to the right, and on the upper level the tanks which feed the high-speed centrifuges.

A large section of the Socfin laboratory at Kuala Lumpur is depicted above. Here, recently added equipment aids in the solving of research problems on the production and handling of liquid latex of specified types.



A detailed view of the latex feeding tanks and centrifugals at the Bungsar Estate Latex Factory.

Technicians working at a mill and an autoclave in the preparation and vulcanizing section of the Socfin laboratory.

Modern Quality Control Applied to Compounding

By ANTHONY OLADKO

Johnson & Johnson, New Brunswick, N. J.

ONE of the important quality measurements in most compounding room operations is the plasticity of the stock or compound which is milled. This article will attempt to point out how the control chart technique of statistical quality control can be applied very effectively to the compounding process, particularly to the plasticity characteristic.

Method of Testing

One mill was selected and isolated for a period of a week. The same formulation was compounded on this mill for the entire week and records were kept on the batches produced by both the first and second shift. The same first shift operator was used all week, and similarly, the same second shift operator. On this particular formulation, the Williams Plastometer was used to obtain plasticity determinations although the same principles can be applied to different stocks and different methods of determining plasticities.

Five individual samples were taken on each and every batch, approximately ten inches apart along the width of the mill rolls. The five samples from each batch gave a sub-group of five. This means that the plasticity for the batch was the average of the five individual plasticities, and the total range or variation within the batch was the difference between the highest and lowest reading of the five samples. The average and range for each batch was posted on a chart similar to the one illustrated which is known as an $\bar{x}$ (average) and R (range) chart. The batches produced by each operator were identified on the chart.

At the end of the week all the necessary mathematical work was done to establish tentative control limits.

Grand average is equal to the total of the average batch plasticities divided by the number of batches.

$$\bar{\bar{X}} = \frac{103.386}{60} = 1.7231$$

Average range is equal to the total of the batch ranges divided by the number of batches.

$$\bar{R} = \frac{730}{60} = 0.1216$$

Sub-group number is equal to the number of individual samples per batch.

$$n = 5$$

The following statistical factors are available in tables and are equal to the figures shown when "n" is equal to 5:

$$D_4 = 2.11$$
$$D_3 = 0$$
$$D_2 = 0.58$$

The following formulas are also available in statistical control tables:

Upper Control Limit for Range

$$UCL_R = D_4\bar{R} = (2.11)\ (.1216) = 0.2566$$

Lower Control Limit for Range

$$LCL_R = D_3\bar{R} = (0)\ (.1216) = 0$$

Upper Control Limit for Averages

$$UCL_{\bar{x}} = \bar{\bar{X}} + A_2\bar{R} = 1.7231 + (0.58)\ (0.1266) = 1.7936$$

Lower Control Limit for Averages

$$LCL_{\bar{x}} = \bar{\bar{X}} - A_2\bar{R} = (1.7231) - (0.58)\ (0.1266) = 1.6526$$

Looking at the accompanying chart, there are five points which fell outside of the control limits on the $\bar{x}$ portion of the chart. The "R" portion of the chart shows two points barely outside of the control limits. Since the averages for these two points were in control, it was reasonable to assume that the two batches had not been thoroughly milled.

After the determination of tentative control limits, later runs showing out-of-control points on the $\bar{x}$ chart were immediately checked and the causes were assignable to the following factors:

1. Variation in raw materials.
2. Variation in time cycle and procedure.
3. Variation in temperature.

It can readily be seen that through the elimination of the causes of out-of-control batches, the control limits on future runs were easily recalculated and narrowed. The average plasticity can be positioned by formulation or procedure and, with narrower control limits, a more uniform product is assured.

In this specific application of the control chart technique, the "R" chart plays a very important role. It indicates to a very great degree the uniformity or homogeneity of the compounded stock. Since five samples through the mill batch are taken approximately ten inches apart across the face of the mill, the spread between the high and low readings of the samples indicates the variation *within* the batch.

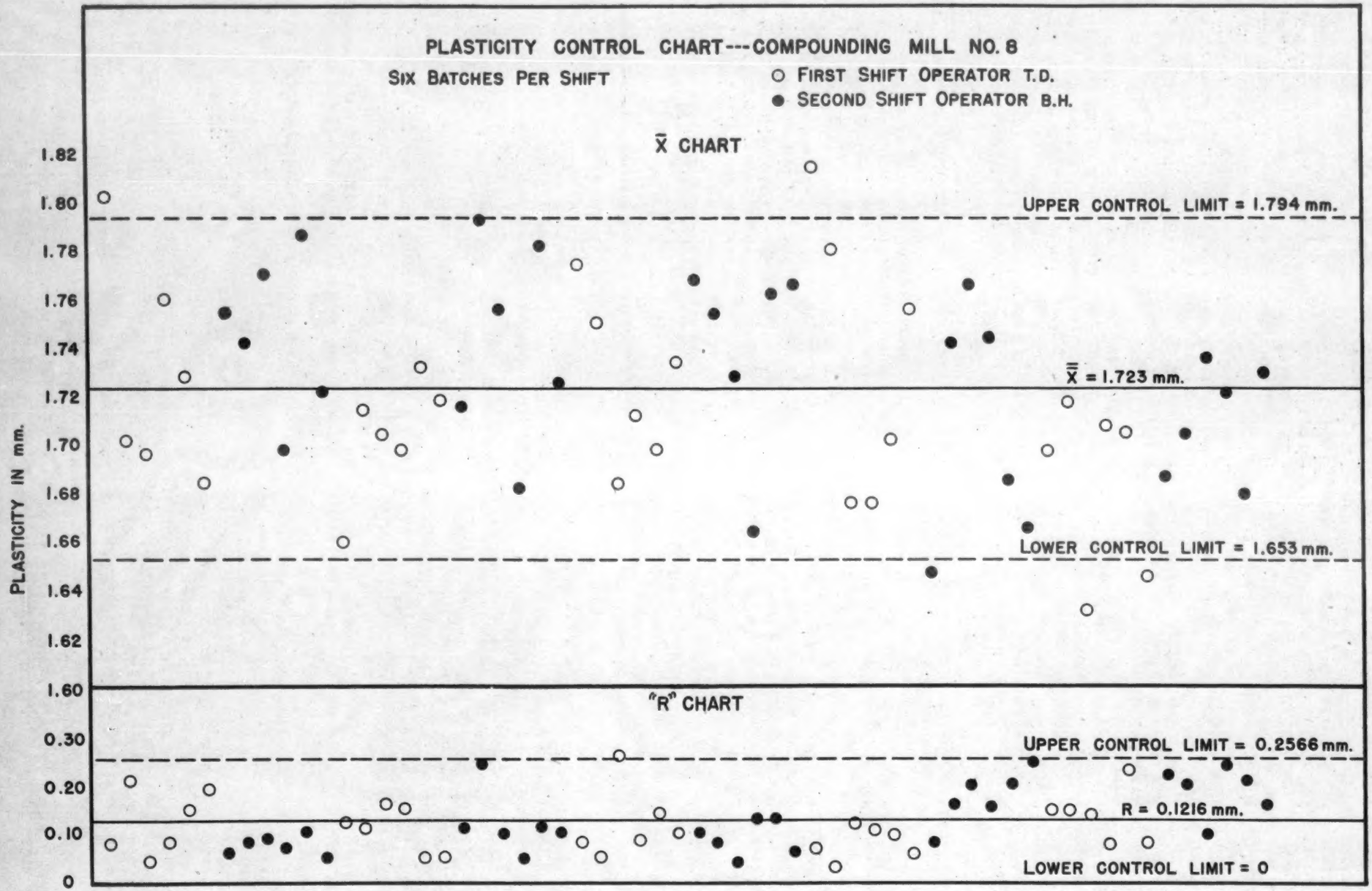
Interpretation of Results

A study of the accompanying chart shows a high degree of uniformity within each batch. An analysis of the formulae used to obtain the control limits indicates that the limits for $\bar{x}$ are dependent upon the limits for R. As one set of limits is narrowed through better procedures and control, the other set of limits of necessity is narrowed. This continued tightening of control limits within economical and practical considerations leads to a high degree of product uniformity both within the batch and from batch to batch.

Another aspect of the control chart technique when used on two different operators is the possibility of determining variations between operators. In the above case, the batches made each day by each operator were averaged as follows:

	1st Shift Operator—T.D.	2nd Shift Operator—B.H.	Difference
Monday	1.729	1.745	+0.016
Tuesday	1.704	1.742	+0.038
Wednesday	1.724	1.740	+0.016
Thursday	1.734	1.709	—0.025
Friday	1.685	1.710	+0.025

Off-hand, one would say that the second shift operator



EACH POINT IS A SUB-GROUP OF FIVE SAMPLES IN ONE BATCH

had a tendency to produce higher plasticity batches than the first shift operator. A statistical test called the Student "t" is a means of determining the probability that the average of one operator is higher than the average of another operator merely due to normal chance variation. In this case, after applying the test it was shown that there was better than a fifty-fifty chance that such a variation would normally occur between operators.

In summary, the following conclusions can be drawn regarding the application of the control chart technique to compounding:

1. The mere initiation of the technique gives management an insight as to what variations prevail in compounding.
2. The high-lighting of out-of-control batches initiates a search for assignable causes while the entire case is fresh in everyone's mind. Very many times the assignable cause can be eliminated or its effect minimized.
3. The variations amongst operators can be determined and tests made as to the significance of the variations.
4. By having a control chart on each compounding mill, the variations amongst mills can be determined in the same manner as for operators.
5. Proof instead of opinions can be provided in speaking of the effects of raw materials, equipment, procedure, and human element.
6. An ever higher quality and more uniform stock can be compounded until the proper balance is struck between cost and quality.

Correction of Unsafe Practices

ACCIDENTS do not occur every time somebody does something wrong. A man doesn't get hurt every time he lifts something while standing in an awkward position. He may trip over a wire or other misplaced objects many times and not be hurt. He doesn't get barked knuckles every time a poorly fitted wrench slips. He may fail to wear a face shield or goggles on many occasions when the exposure is only momentary and not suffer an eye injury. But if he continues to do these things which are contrary to good practice, then the serious injury will eventually occur.

Prevention is the work that is done before the accident occurs. It is the process of knowing what the probable causes of accidents are, recognizing their existence, and actually doing something to stop the practice. The work that is done after an accident has occurred is not prevention so far as that accident is concerned. It is an attempt to derive some good from the loss that has occurred by definitely establishing the cause of the accident so that other employees using the same improper procedure may be corrected—and thus it is preventive work for the future.

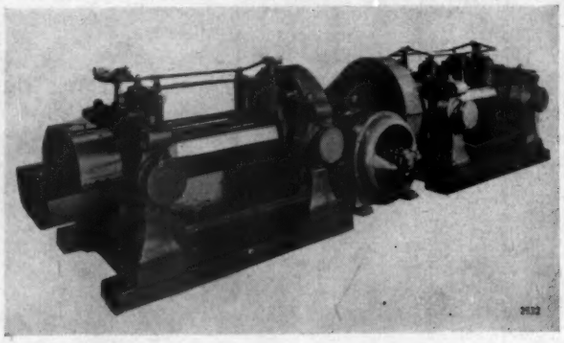
A supervisor does not have to be at the scene of the accident to carry on effective work in accident prevention. His responsibility is to see that people do things in the right way. He has the opportunity of observing improper working methods many times before the accident happens. He, however, must be able to recognize them, must understand their importance from the standpoint of preventing interruption of production and the probable occurrence of an accident, and then talk to the employee or employer to see that the unsafe practice is corrected.

Rubber Safety Letter

Two 60-Inch Mills Driven by a Single Geared Speed Reducer

INSTALLATION of the two 60-inch mills set in a compact twin arrangement with both mills driven by a single "Cone-Drive" geared speed reducer establishes what is believed to be another first in the rubber industry. Developed by Adamson United Company, Akron, Ohio, the unit is now being used to mill rubber floor tile at the Wright Rubber Company, Racine, Wisconsin.

The compactness of the design is in large part due to the extremely high load carrying capacity of Cone-Drive gearing. As a result, a speed reducer of only 18″ center



distance provides a horsepower rating of 400 hp at the mill speed, under 24 hour shock service. Since drive is from a single 250 hp motor, an ample safety factor is provided by the design.

The small center distance required with Cone-Drive made it possible to use a reducer with vertical centers (H.U. 8800). A conventional worm geared reducer would not be practical, as the gearing would have had to have a center distance of about 30″ to carry the load. This would have made it mandatory to dig a pit for the reducer or mount the mill on a fairly high subframe.

Since the Cone-Drive reducer used is actually narrower than the motor housing, the limitation on spacing of the two mills is merely the diameter of the motor housing. Thus, the Cone-Drive reducer made it possible to eliminate the need for any extra floor space provision for the machine to take care of the reducer itself.

The compactness of the design also made it possible to reduce the height of the bed plate under the electric motor and place it entirely between the mills. This would not have been possible with a conventional drive, according to Adamson. Incidentally, the design also increased the economy of manufacture of the mill.

In the set-up of a smaller 8″ x 16″ laboratory mill, Adamson also used a Cone-Drive speed reducer, direct-connected to the roll by a universal type coupling. Here again the short vertical centers proved most economical. A conventional right angle drive if used here would have extended the machine in height and width, whereas a straight through or in-line drive would have extended the machine in length. Center distance on the Cone-Drive reducer is only 10 inches.

As used in the laboratory mill, it furnishes 70-to-1 reduction for the 15 hp 1800 rpm motor and is rated to handle 25 hp for 8 to 10 hour service where recurrent shock loading is encountered or 24 hour service where no shock loading is experienced. Due to its ruggedness, incidentally, this laboratory mill is also frequently used for production work.

Panel Discussion on the APPLICATION OF INDUSTRIAL FABRICS

Sponsored by the Akron Rubber Group at Its Meeting on February 18, 1949

AS REPORTED in our previous issue, the highlight of the meeting of the Akron Rubber Group held in Akron, Ohio, on February 18 was a Technical Symposium on Industrial Fabrics. The symposium comprised two specific papers and an extensive panel discussion. The papers included "Cotton as a Raw Material for Industrial Fabrics," by W. F. Busse and H. R. R. Wakeham, of the Institute of Textile Technology, Charlottesville, Va., delivered by Dr. Wakeham, and "Synthetic Fibers in Industrial Uses," by W. W. Owen, of the Rayon Division of E. I. du Pont de Nemours & Co., Inc., New York. Both Dr. Owen and Dr. Wakeham participated in the panel discussion.

The panel was comprised of eight fabric experts. In addition to Messrs. Owen and Wakeham these were: E. M. Penney, Owens-Corning Fibreglas Corp., Toledo, Ohio; A. H. Burkholder, Industrial Rayon Corp., Cleveland, Ohio; R. W. Elder, National-Standard Co., Niles, Michigan; H. S. Grew, Jr., Wellington Sears Co., New York City; H. B. Shearer, American Viscose Corp., Marcus Hook, Penna., and A. B. Baker, American Viscose Corp., Front Royal, Va. Abstracts of the papers by Messrs. Owen and Wakeham appeared in our previous issue. Because of its importance to the rubber manufacturing field we are reproducing below the questions-and-answers in the panel discussion.

Question No. 1—What is the cotton textile industry doing to meet the challenge of synthetic fiber developments?

Answered by Mr. Grew: For reasons of simplification, let's divide the end products of textile fabrics from synthetic fibers into two groups. First, apparel or consumer goods. Secondly, industrial or mechanical goods, exclusive of tire cord and tire cord fabrics. As you all probably know, the textile industry has met the challenge of synthetic fibers in the apparel or consumer goods. Many cotton mills have converted their operations from cotton to synthetic fibers and new mills have been built, and are still being built, expressly for the purpose of producing synthetic yarn fabrics. Now, in the industrial field, in which, I believe, you are more interested, you have an entirely different situation.

The textile industry has been criticized for their tardiness in developing synthetic yarn fabrics for industrial uses. This tardiness cannot be attributed to the lack of enthusiasm in the cotton industry. There are two definite factors, I believe, to which this can be attributed. First, the short supply, or, I might add, a lack of ability to obtain raw materials for these end uses. Secondly, on account of the cycle of time required to obtain approval of the material. In other words, in the consumer field, customers' acceptance requires a relatively short period of time, but in the industrial field, 6 months to 2½ years may be needed for similar approval. In closing, the textile industry realizes the need for synthetic yarn fabrics for industrial and mechanical uses and the cotton textile industry is ready to meet this challenge just as fast as raw materials are made available to them.

Question No. 2—Briefly, how does the Government support program maintain the high price of cotton?

Answered by Dr. Wakeham: The Government support program is an attempt to assure the cotton farmer of a price for his cotton that will be proportional to the prices he has to pay for what he buys. The prices are based on a "parity price" which is the price of cotton averaged over the period 1910 to 1914, multiplied by the index of prices paid. Let me give you an illustration to show what this parity price is. Suppose that the things which the farmer needs now cost three times as much as they did in the period 1910 to 1914; then the parity price (based on ⅞ in. staple) of staple cotton is three times as high as the cotton price was from 1910 to 1914. The 1948 parity price of 15/16 inch middling, for example, fixed at the beginning of the crop year, was about 32½ cents a pound.

The Government accomplishes this support of the cotton price by lending to the farmer money against his cotton crop at a rate based on 92½% of the parity price. Now, the cotton farmer can try to sell his cotton for a price higher than that based on the loan which he obtained from the Government. If he can do that, he will make enough money to pay back the Government loan and have some left over. If he can't sell his cotton at a higher price than that calculated in the loan, he simply turns it over to the Government instead of repaying the loan. Now the Government can do one of two things; either sell at a loss (I can assure you that is what happens much of the time), or hold it in storage until the price of cotton goes up. Sometimes the Government cotton can be sold at a profit, and under the present plan the farmer shares in the profit. At the same time, the higher price of cotton hurts the cotton farmer by stimulating the production and use of competitive fibers.

As I said before, the support program is an attempt on the part of the Government to establish a cotton price based on a cost-of-living factor. Now in the Aiken Formula, scheduled to be effective in 1950, the Government-established prices are not the parity price, but a gradually decreasing percentage of the parity price. Last year that percentage was 92½ per cent. The new 1949 support price is presently fixed at 90% of parity. What the actual price will be depends on the parity price. Some legislators are even attempting to reduce that percentage gradually over a period of years until the price of cotton will be determined by the law of supply and demand, rather than by the price support program.

Question No. 3—Does the treatment of cotton, in sliver form, with aqueous silica suspensions or colloidal silica improve its properties for use as tire cord?

Answered by Dr. Wakeham: The development of silica treatment in silver form was made at the University of Texas and I might say at first, the result of these tests was published in the *Textile Research Journal* (Vol. 17, pp. 331-339, 1947), in case any of you want to look it up. They claim to have improved the strength of the yarn as a result of silica treatment of fibers. I have not seen any results which indicate that the strength improvement might be carried over into tire cord.

Question No. 4—What fabrics are best as bases for vinyl or pyroxylin coatings, and what adhesives or sizes are best for pretreating the fabric for this type of coating?

Answered by Mr. Grew: I think you have to divide this question into two parts. Prior to the war, pyroxylin-coated fabrics dominated. As a result of developments during the war, vinyl-coated fabrics are rapidly replacing pyroxylin-coated fabrics. For pyroxylin-coated materials, standard wide drills, broken twills, sateens, and wide sheetings are commonly used. There are definite differences of opinion as to the fabrics best suited for vinyl-coated material. In the first place, due to the difference in the application of pyroxylin and vinyl resins, you have an entirely different action. For example, the vinyls tend to follow the "hills and the valleys" in a woven fabric. To overcome this tendency, material should be developed to minimize the effects of these "hills and valleys." I believe revolutionary developments are on the way to overcome some of the present difficulties in vinyl coating.

I would like to touch briefly on the material which is presently known as non-woven material, but at the same time, I would like to point out that the non-woven materials now commercially on the market have uni-directional strength and tend to separate when subsequently processed. However, a new non-woven material has just come on the market possessing the same strength and tear around the clock, which tends to increase the tensile and tear strength for the subsequent process.

As far as treating fabrics with adhesives for coating, I do not believe that as manufacturers of the fabrics we are qualified to say much about this feature, as this seems to be a problem for the coaters themselves to determine. We do know, however, that to get the best adhesion, especially with vinyls, the fabrics should be desized. On the other hand, research work is being carried on in a limited way to develop sizing materials, other than those commonly used, which would be compatible with the resins used by the coaters, eliminating the necessity for desizing the cloth. With this possibility in mind, I again mention the non-woven materials which can be bonded with resins similar to, or at least compatible with, the resins subsequently used.

Question No. 5—Does the cellulose tend to degrade when curing around 250° F? (or 300° F)?

Answered by Dr. Wakeham: Yes, especially in the presence of moisture and air. If this question refers to a tire or the cure of a tire, then I would say that no appreciable degradation takes place in the actual cure of a tire, because, in the tire cured at high temperatures, moisture and air are excluded. When moisture and air are present, the degradations occur more rapidly. The higher the temperature, the more rapid the degradation. There has been some very interesting work done by the DuPont people at their Richmond plant on degradation of tire yarn, both in the presence and absence of air. This work shows that, in the absence of moisture and air, rayon is degraded somewhat more slowly than cotton, and, in the presence of moisture and air, rayon is degraded more rapidly than cotton.

Question No. 6—What is being done with the development of rayon fabrics for belting? For hose? Nylon for chafer fabric? Blends of nylon? Cotton for belt covers?

Answered by Mr. Grew: I think I have partially answered this question in the answer to Question No. 1, because the development work being done has been absolutely dependent on the amount of raw materials available. We do know that high-tenacity rayon fabrics have been developed for use in belts and woven hose and are now out in the field under actual operating conditions. A limited amount of experimental work has been carried on with nylon for chafer fabrics and blends of nylon and cotton have been tried out for belt covers which, I assume, refers to covers used on V-belts. As already stated, 6 months to 2½ years may be required to determine whether the synthetic fabrics are economically sound and better in performance than the materials being used today. The rapidity with which these fabrics can be made available to the rubber industry depends, as already emphasized, on our ability to obtain the necessary raw materials.

Question No. 7—Aminizing cotton—that is, treatment with 2-amino ethyl sulfuric acid—permits introduction of metallic elements and various organic groups. Does this procedure hold any promise for use in rubber goods?

Answered by Dr. Wakeham: I might say, to begin with, that this treatment was developed in the laboratory for the purpose of making a dye-fast cotton fabric. If the things which cause tire cords to lose strength or to degrade can be excluded by attaching things to the cellulose, then this treatment shows promise of improving the usefulness of cotton for rubber goods.

Question No. 8—What fabrics are best suited for shoe fabrics?

Answered by Mr. Grew: Fabrics commonly used today in the manufacture of shoes are wide duck, army duck, drills, knitted fabrics, and other specialties. In discussing shoes, you should really break down the type of shoe under consideration. In most cases the economic equation is the determining factor in the fabrics best suited for shoes. This is especially true in the sneaker type of shoe. These shoes usually fail for two primary reasons. First, deterioration because of perspiration, and secondly because of abrasion. I believe, with a little cooperative work on the part of the textile industry and the shoe industry, fabrics can be developed from synthetic fibers which will be economically sound and which will last much longer if the synthetic fiber selected is inherently resistant to perspiration and abrasion.

Question No. 9—Discuss the possibilities of the applications of ramie fiber to the rubber industry.

Answered by Mr. Grew: We have done a considerable amount of research with ramie. We have found, first of all, that for industrial fabrics at the present time it is

economically unsound. Secondly, although the yarn itself will prove stronger than an equivalent cotton yarn, we have been unable to carry that strength into the woven fabric. In addition, we have been unable to weave a fabric with sufficient crimp to permit you to subsequently process it and have any crimp left in the material.

Answered by Mr. Shearer: As a rayon man, it may be difficult to understand why I have been assigned to answer this question and above all, in with this cotton group, unless it be that I seem to be one of the two present who have had some limited experience with the processing of this fiber. It is our opinion, that before ramie can be seriously considered for industrial or other textile uses with rubber, many changes and improvements in its methods of production, preparation and processing will have to be made. These do not seem to be economically or physically feasible of accomplishment so as to offer serious competition to synthetics as now produced and as may be expected of them in the future. Slight differences in the weather, method and age of harvesting, or methods of decordicating and degumming, each will materially affect the quality of the fiber. These conditions are difficult to control. Equipment for decordicating, and methods of degumming, are yet to be perfected.

At present the raw undegummed fiber costs around 30c per pound. Degumming, spinning and handling costs make this yarn sell for around $2.00 per pound. While the fiber possesses good wet and dry strength, it varies considerably, has a high degree of brittleness, is nonuniform in diameter and in staple length. These make the economical spinning of a yarn of uniform quality with good physical properties, as needed for tires and mechanical rubber goods, seem very remote.

Question No. 10— What is the present day thinking on the finishes used to improve the processing of rayon filaments, with reference to its fatigue resistance?

Answered by Dr. Owen: There is wide disagreement between members of the rubber industry as to what is the best type of finish, as well as disagreement between the various rayon producers. The best type of finish probably is yet to be found. However, there is considerable evidence that the oil type finish has improved fatigue resistance either directly or indirectly. Ultimately, both the tire industry and rayon producers may find and agree on what might be considered a universal finish, but I am afraid that time is remote.

Question No. 11—What has been done to prevent the low wet strength of rayon yarns?

Answered by Mr. Burkholder: The reduction in strength of viscose rayon upon wetting had been a matter of concern with respect to clothing long before rayon was used in the manufacture of tire cords. While much is unknown in this regard, two things are fairly well established. First, high strength rayons have a higher wet to dry strength ratio than less highly stretched rayon. This means that when a rayon is stretched to increase the dry strength, the wet strength increases to even a greater extent. Secondly, many attempts to increase the wet strength by chemical reaction, such as with formaldehyde, have resulted in the reduction of other desirable characteristics, such as dry strength and flexibility.

Question No. 12—What advantages in quality are to be had by pot spinning over spool or continuous spinning?

Answered by Mr. Burkholder: The question implies that rayon from one type of spinning machinery is inherently superior to that from another for use in tires. The consensus of opinion of the rayon manufacturers is, that there are so many other variables in the manufacture of rayon such as type of spin bath, degree and place of stretching, kind of processing solutions, type of finish, etc., that some of the observations which may have led to the conclusion implied in this question were the result of other factors, so that the characteristics observed in tire performance could have been coincident with the method of spinning rather than a necessary result of it.

Question No. 13—What is the thinking on optimum yarn size of continuous filament rayon to tire performance?

Answered by Mr. Baker: We are necessarily guided in our thinking and actions along this line by demand and customer preference. We, as an industry, are now producing at least three different deniers of yarn for the tire trade. Each of these seems to have some degree of support in the rubber industry. During the last few months the volume of 1650 denier has increased approximately 20%. Some of this increased volume has been at the expense of 1100 and 2200 while some represents new production. Indications are that any definite trend is toward 1650 denier. There have been perceptible interruptions in this trend from time to time but it has shown no tendency to stop. We do not say that 1650 is the optimum yarn size but it is, at this time, the most popular.

Question No. 14—How would you review the thinking relative to dip penetration for good fatigue resistance performance of rayon?

Answered by Dr. Owen: Results of laboratory studies combined with experience of the tire industry as a whole have indicated that low penetration of dip is desirable. What we feel is needed is a type of textile structure that can flex and bend with each revolution of a tire. If filaments are cemented together with an adhesive they are not able to slide on each other as a tire is flexed so that cord will behave more like a monofil than as a supple textile structure. By confining penetration of dip to the outer layer of filaments, which may be 3 to 6 filaments deep, depending on the type of adhesive and filament surface condition, there is evidence that better cord structures are obtained. It is known from past experience that a monofilament cord is not a satisfactory structure for the types of flexing that occur in a tire.

Question No. 15—Can an adhesive be applied to rayon by the rayon manufacturer to eliminate treatment of the cord by the rubber manufacturer?

Answered by Mr. Burkholder: This seems to be a perennial question. I interpret it to mean that the adhesive would be applied to the rayon yarn rather than to the cord so as to get thorough coverage of all of the filaments. It seems that all of the adhesives which are effective in fastening materials to rubber are sticky; thus, the filaments would stick to each other as well as to the rubber. When yarn so treated is twisted into cord, the required movement of filament over filament would be prevented. The resulting cord would not have the usual smooth and rounded appearance but would be rough and irregular as if it were a twisted ribbon.

The various textile operations associated with twisting yarn into cord utilize a number of guides and tensioning devices which require that the yarn be lubricated; wholesale modification of machinery parts would be required to handle a yarn coated with an adhesive in place of a lubricant. Application of the adhesive by the rayon manufacturer would require a material which could be stored without aging and which would best suit the needs of each consumer. The present dipping units handle fabric containing approximately 2000 cords which are equivalent to 4000 ends of yarn. The usual slasher beam holds less than 200 ends of yarn. Thus, the present problem of keeping the dipping equipment clean would be multiplied by a factor of 20 or more if the adhesive were to be applied to the yarn.

Question No. 16—What are the prospects for a continuing supply of wood pulp or other raw materials for rayon manufacture? Are the sources adequate for present, or possible increased, rate of consumption?

Answered by Mr. Shearer: The trend is for pulp production to keep pace with rayon production. Rayon production in 1948 has been estimated at 1,100,000,000 lbs. Against this, there was available a new 1948 production of dissolving pulp of some 1,294,200,000 lbs. In the next two years, rayon capacity is not expected to be increased by more than 190,000,000 lbs. To take care of this increase, the building of one dissolving pulp plant was initiated in 1948. Plans for the building of two more have been announced and negotiations for two additional ones have been reported. Should just two of these pulp mills be in production in 1951, there will be an additional 250,000,000 to 300,000,000 lbs. of dissolving pulp produced at that time. This should more than take care of all prospective requirements of the rayon industry. The pulp plants coming into production are the Celanese Corp. of America plant at British Columbia in 1951; the International Paper Co. plant at Natchez, Mississippi, in 1951, and the American Viscose Corporation plant in Alaska in 1952.

Question No. 17—What progress is being made in overcoming the fatigue break problem in rayon carcasses? How is any advance being achieved?

Answered by Dr. Owen: It seems I have heard that question before. When the tire industry first began making tires with synthetic rubber, you know the kind of performance obtained far better than I. In most cases, I believe, you first tried to make tires essentially the same way you did with natural rubber. As soon as the Government released its restrictions on rayon and permitted its use for passenger tires, many, without much background of experience, immediately started to produce rayon passenger tires with little change in design from that used for cotton tires. As a result, some had rather serious difficulties. I think the experiences we have had during the past several months have indicated quite clearly that no single factor has been responsible for the difficult growing pains through which the tire industry has been going. Everybody is learning a great deal, and it seems to me, at least on the basis of what I have seen, that one of the most important factors in this problem is dynamic adhesion.

I have observed a large number of so-called fatigue failures which I am certain have been due primarily to lack of adequate bond between rubber stock and cord. Failure of this bond with separation of cord from rubber is believed to permit buckling of filaments within a cord structure under compression with subsequent rapid cord failure. Different types of adhesive have been used to overcome this trouble in several instances. Others have improved the situation by increasing the twist in both the single and cord structures and increasing end count in cord fabric. Some producers now are making rayon tires that are considered adequate in performance; possibly not up to the level of performance which they would like to have, but at least equivalent to that previously experienced with cotton.

Question No. 18—Rayon and cotton cords each have certain inherent weaknesses as tire fabrics. Don't you think that the strong points of one can compensate for the weak points of the other, by making a cord comprising say 60% rayon and 40% cotton?

Answered by Mr. Baker: We have no definite information on tests along this line. We do know that some tests have been made but the results have not been made available to us. We have seen on several occasions tires in which the plies were inadvertently mixed. As far as we know, premature failures resulted in every case and showed the breakdown to originate in the odd type ply. This was true regardless of which type yarn appeared in the odd ply. These were load carrying plies, of course, as we know that breaker construction can vary from that of the carcass with no ill effects. Failures of this kind probably come about through the difference in elongation characteristics of the two yarns which result in ply separation. We feel that these characteristics vary so much that a deliberate mixture would tend to accentuate rather than compensate the weaknesses of each. At this time we would not recommend the practice of mixing these two fibers either in the cord or in the tire building.

Question No. 19—How does the performance of wire carcass tires compare with cotton or rayon cord carcasses?

Answered by Mr. Elder: Thus far, wire tires have been limited in application to bus and truck usage for the most part. Increases of up to 40% in original tread mileages have been observed which are attributable to cooler running characteristics because of better heat dissipation. Inflation pressures are higher, of course, being calculated to allow about 10% maximum deflection rather than the 12% customary with textile cord fabrics. The fact that the strength of the carcass is not deteriorated due to heat generation also permits many additional retreading operations. While this question was asked primarily about wire carcass tires, I might add that much the same line of reasoning applies to the usage of fine wire cable in V-belts and aproximately ½ of the present output is used for V-belt applications.

Question No. 20—What are the chances of wire becoming competitive with cotton, rayon, or other synthetic yarns with respect to price?

Answered by Mr. Elder: The wire is still in the development stage and hence volume production has not been achieved on the wire reinforcing medium. Despite inflation, a reduction in the price of the wire of approximately 40% has been made over the last five years. In view of the uncertainty of the future it is, therefore, extremely difficult to foresee a time when wire tires will be competitive with rayon or cotton as far as initial cost is concerned. If ultimate mileage with retreading is considered the wire tire is now competitive or even more economical in specialized applications.

Question No. 21—How does the fatigue resistance of wire cord compare with cotton and rayon cords?

Answered by Mr. Elder: This is a rather difficult question to answer definitely. I do not know of any specific test that would be applicable to cotton, rayon and wire. I suppose a pulsating tension test would give the best answer. If viewed from the standpoint of giving an answer of endurance limit expressed in so many thousand pounds per square inch the wire would probably have the highest value. You would probably, however, be more interested in a practical test such as flexing a sidewall section through a given arc over a given radius of curvature in which case the wire would probably be the poorest medium. Control of this flexing, of course, is the reason for the higher inflation pressures recommended for wire tires.

Question No. 22—What are the potential advantages of glass yarns in tires, belts, hose, etc.?

Answered by Mr. Penney: We feel there are many potential advantages in the use of Fiberglas products in hose, belts, tires, coated fabrics and various types of mechanical goods. The principal advantages to be offered are the following: (1) The extremely high tensile strength available as evidenced by the high strength to weight ratio of the material. (2) The lack of cold flow in the fabric prevents the hose or tire from swelling under pressure or V-belts from stretching. (3) The high thermal conductivity of glass means that heat generated in the structure can be more rapidly dissipated, thus lowering the average operating temperature. (4) The resistance of Fiberglas to fungi attack, moisture and humidity should also tend to make for increased life of the products. (5) The high strength properties of Fiberglas should theoretically permit the manufacture of tires, for example, wherein fewer number of plies were used, thus permitting a savings in both fabric and rubber with a possibility of improving the flexibility of the tire and its ability to take road shocks. This is the best way that I know to answer the question and I appreciate that some of the persons present may be inclined to take exception to some of these statements on the basis of experimental work conducted in their own laboratories in the past. However, we believe that we are making some fundamental advances in the improvement of basic Fiberglas products and that, plus our past experience, is the basis for the statements made.

Question No. 23—What success has been made in producing a tire cord from Fiberglas yarns with twist necessary to obtain high fatigue resistance? What is being done to improve the fatigue resistance of Fiberglas yarns?

Answered by Mr. Penney: In answering these questions it is necessary to remember that fatigue resistance, as technically defined, is very high in Fiberglas fibers. We have numerous test results that indicate single glass fibers will sustain 75% of their high ultimate strengths indefinitely. These results have also been substantiated by work conducted at Corning Glass Works evaluating high strength glass rods in test procedures extending over a period of 10 years.

What is frequently defined or interpreted as fatigue when referring to Fiberglas tire cords is really, we believe, a matter of fiber to fiber abrasion and/or unequal loading of the individual filaments in the cord due to the relatively low elongation possible with glass filaments. Glass filaments have a maximum elongation between 3 and 4% before breaking. By comparison in the case of some of the other synthetics when they are loaded, individual filaments tend to stretch until the loads are distributed and are essentially uniform. However, slack filaments in a glass cord bear little or none of the load until the taut filaments have been stretched so far that they break. Under such conditions it is obvious that the potential strengths would never be realized since the breakage would be progressive in nature. We have had some measure of success during the past two or three years by coating strands with various types of resin and combining these coated strands into a cord using relatively high twists.

One item of particular interest in this study is the fact that "wild" or "unbalanced" cords seem to show better properties than the conventional balanced structures. To summarize, we believe there are several ways of improving the so-called fatigue resistance of glass cords:

(1) By improvement in cord construction which would reduce filament to filament scratching and tend to improve the distribution of load between the various filaments. We are convinced that further progress along this line can be made but doubt that it will prove to be the entire answer to the problem.

(2) By surface sizes, lubricants, or coatings around each individual filament to produce what would be essentially an insulation medium thus protecting each filament from its neighbors. We must admit that we have as yet been unsuccessful in accomplishing this but we do believe that this approach offers perhaps the best possibility for solving the problem. However, at this point, it must be remembered that some forms of lubrication to achieve this end point may in turn prove completely unsatisfactory in uses such as are being considered today since they may prevent satisfactory adhesion of rubber compounds to the glass surface.

(3) By coating the individual filaments of a strand with fairly hard resins such as some of those used for reinforced plastics it is possible to prevent the movements of filaments in relation to each other. Also the use of such resins tends to aid materially in distributing tensile loads uniformly throughout the mass. If such coated strands are made small enough the required flexibility is retained when twisted and plied into cord structures.

Question No. 24—What are the advances in surface treating of glass yarns to reduce inter-filament abrasion? Has a suitable adhesive for Fiberglas cord been discovered?

Answered by Mr. Penney: One of the advantages of surface treatments for glass yarns is also to prevent the adsorption of water or water vapor on the surface of the glass since under these conditions the abrasion resistance between adjacent glass surfaces decreases materially. Furthermore, if properly chosen these surface treatments may be used to promote adhesion between plastics and rubber compounds to the glass surface by acting as an intermediate bonding agent or cement.

As for the second portion of the question I shall attempt to answer it in this fashion. In producing coated fabrics we do not try to get too good an adhesion of the coating material to the yarn in the fabric but attempt to have the glass fabric embedded in the coating mechanically by designing the fabric open enough to permit forcing the coating compound through the interstices. This permits the yarns to slip or shift very slightly and appears to promote improved flexing and abrasion properties. It is questionable, however, that the lubricants used on the yarns and found to be satisfactory for coated

fabric uses would be suitable for tire cord applications. We do find that natural rubber, Hycar and polyester resins have reasonably good adhesion to glass but we are convinced from work done to date that much can be done through proper designing by you people in the rubber business.

We are not designers of tires, hose, belting, or mechanical goods. You people represent those who are capable of producing new creations on the basis of your past experience and are in a position to utilize the properties of new materials most effectively. We firmly believe that the properties of Fiberglas can contribute to the production of many improved rubber products but to accomplish this will require careful and proper designing.

Question No. 25—Can any change be made in the high stretch characteristic of nylon yarn or cord?

Answered by Dr. Owen: The elongation characteristics of nylon filaments seem to be inherent in the type of chemical compound. At the present time, we know of no way in which this can be materially altered nor do we anticipate such a treatment soon. A practical answer to this question may be to use sufficient yarn to provide an elastic modulus suitable for the load to be applied or to compensate for this stretch through process changes in the particular applications involved.

Question No. 26—Are there nylons which have a different dimensional stability toward temperature changes than does Type 300 Nylon?

Answered by Dr. Owen: The statement just made with respect to elongation and the nature of nylon also applies to dimensional stability at elevated temperatures. All nylons manufactured today have essentially the same response to temperature. The present types of this fiber have the best balance of properties that we know how to produce.

Impregnation of Leather with Elastomers and Synthetic Resins

RESIN treatments that promise to effectively improve the wear resistance of sole leather have recently been developed by Rene Oehler and Timothy J. Kilduff of the leather laboratory at the U. S. National Bureau of Standards. In addition to increasing the abrasion resistance, the use of synthetic resins should reduce the amount of tanning materials now required to produce high-quality leather. The success of the resin treatments coupled with the knowledge gained in their development, suggested the possibility of a similar leather treatment using rubber. Further research is being directed toward this end by Bureau scientists.

Early Investigations by Bureau

During World War II the military and civilian requirements for shoes were so great that the tanning industry experienced difficulty in expanding operations sufficiently to meet the increased demand. Of chief concern were the acute shortages of hides and tannins (quebracho and other vegetable tannins). To alleviate the situation, the National Bureau of Standards investigated several oil and wax treatments, which were adopted by the Armed Forces to increase the wear resistance of sole leather. During these investigations it became evident that treatment with synthetic resins might further improve the wear of soles as well as make them and the upper leather more water resistant.

As a result of the war stimulus, three laboratory methods were developed for treating leather with resins. The first method of treatment may be accomplished by immersing the leather specimens in manomer and subsequently polymerizing *in situ;* the second method consists in immersing leather in polymer solutions, which may or may not be elastomers; while the third involves immersion in a partially polymerized liquid resin which is further polymerized in the leather itself. In connection with the second method, gutta-percha, Castilloa and Hevea natural rubbers, as well as synthetic elastomers, and various acrylate solution-polymers were tried. The third method of impregnation was developed in cooperation with the Thiokol Corporation, using Thiokol LP-2.

Abrasion resistance as determined with the National Bureau of Standards abrasion machine — an indication of the wear to be expected of sole leather — is improved approximately 75 percent for vegetable-tanned crust leather impregnated with *n*-butyl methacrylate monomer, followed by polymerization *in situ.* The abrasive resistance of the untreated crust leather was approximately the same as that of sole leather. Treatment of vegetable-tanned crust leather with solutions of Castilloa rubber improves abrasion resistance about 50 percent, while treatment with Thiokol LP-2 improves resistance about 30 percent. However, treatment of vegetable-tanned crust leather with polybutyl methacrylate solution-polymer showed no improvement in abrasion resistance.

Results of half-hour static water absorption tests reveal a reduction of one-tenth to one-third the amount of water absorbed by untreated leather, depending upon the kind of leather and treatment. Water vapor permeability of treated shoe upper leather is higher than similar leather containing 20 percent grease.

Improvements by Rubber Treatment

Preliminary research with rubber solutions has shown that, by proper choice of processing methods, as much as 20 percent of rubber can be deposited within unfinished vegetable-tanned leather. The process may be satisfactorily applied to several different types of leather. Dynamic, or wet-flex, water absorption and water transmission of sole leather as well as abrasion resistance are all improved about 50 percent by rubber treatments. Solutions of natural rubbers having 40 percent or more of rubber are prepared from cold milled rubbers and conventional solvents. The impregnated rubber may be vulcanized in place by the use of an ultra accelerator of the dithiocarbamate type. Service tests on shoe soles and pilot plant processing runs are planned as the next step in the investigation.

(EDITOR'S NOTE: For complete technical details of the work on resins the reader is referred to the article on "Treatment of Leather with Synthetic Resins," by Oehler and Kilduff, *Journal of Research,* Vol. 42, p. 63, 1949.)

Division of Rubber Chemistry, A. C. S., Meets in Boston on May 23, 24 and 25

THE SPRING MEETING of the Division of Rubber Chemistry of the American Chemical Society, as previously announced, will be held at the Hotel Statler in Boston, Mass., on Monday, Tuesday and Wednesday, May 23, 24 and 25. The first session will get under way on the afternoon of May 23, with the concluding session scheduled for the afternoon of May 25. James C. Walton, of the Boston Woven Hose & Rubber Co., Cambridge, Mass., is chairman of the local arrangements committee.

One of the most active programs ever held at a meeting of the Rubber Division has been planned for Boston. In addition to the presentation of twenty-five technical papers, including a number on low temperature polymers, the meeting will feature a business session, presentation of the Charles Goodyear Lecture, a luncheon of the 25-year club, an old-fashioned clambake, visits to rubber plants in the Boston area, and the divisional banquet. A suppliers' cocktail party will precede the banquet.

The luncheon of the 25-year club will be held on Monday, May 23, with John M. Bierer, of the Boston Woven Hose & Rubber Co., acting as chairman. Since a large turn-out is anticipated for this luncheon it has been requested that all those planning to attend advise Mr. Bierer of such intention prior to the meeting. The clambake will be held on Monday evening at Marblehead, Mass., with clams, lobsters and chicken cooked on rocks and seaweed and served on the shore. Transportation by buses along the scenic North Shore has been arranged. Since the clambake is to be held the first evening of the meeting and since advance preparations are necessary, tickets must be purchased before May 18 and none will be sold at the meeting. Arrangements for attending the clambake can be made through H. W. Sutton of Boston Woven Hose.

Another feature of the meeting will be the visits to rubber plants. On Tuesday afternoon, May 24, special buses will take members and guests on inspection trips to the plants of the Boston Woven Hose & Rubber Co., the Dewey & Almy Chemical Co., the Hood Rubber Co., and the Simplex Wire & Cable Co. Details concerning these trips will be available at the meeting.

The divisional banquet will be held in the Imperial Ballroom of the Hotel Statler on Tuesday evening, May 24. The suppliers' cooperative cocktail party, which will precede the banquet, will be held in the hotel's Georgian Room. Ladies are invited to the banquet, and a special series of trips has been arranged for them during the meeting.

One of the highlights of the banquet will be the presentation of the Charles Goodyear Medal to Dr. Harry L. Fisher, director of organic research of U. S. Industrial Chemicals, Inc. The presentation will be made by Harry Outcault, who, as immediate past chairman of the Division, is chairman of the Charles Goodyear Medal Committee. After the presentation, Dr. John T. Blake, of the Simplex Wire & Cable Co., will deliver an address on "Achievements and Characteristics of the Medalist," following which Dr. Fisher will present his Charles Goodyear Lecture on "Rubber Research and the Need of a Rubber Research Institute in the United States." Another highlight of the banquet will be the presentation of an address by Gen. George C. Kenney of the U. S. Air Force.

Abstracts of the twenty-five papers scheduled for presentation, together with the authors of the papers, follow:

Program of the

DIVISION OF RUBBER CHEMISTRY
AMERICAN CHEMICAL SOCIETY

Hotel Statler, Boston, Mass.
May 23-25, 1949

Monday Afternoon—May 23

12:00 Noon—Luncheon of the 25-Year Club.
1:50 P.M.—Opening Remarks, by Dr. Howard I. Cramer (Sharples Chemicals), Division Chairman.
2:00 P.M.—Technical Papers.

Monday Evening—May 23

7:00 P.M.—Old-Fashioned Clambake, Marblehead, Mass.

Tuesday Morning—May 24

9:00 A.M.—Technical Papers.

Tuesday Afternoon—May 24

2:00 P.M.—Visits to Rubber Plants in the Boston Area.

Tuesday Evening—May 24

5:30 P.M.—Suppliers' Cooperative Cocktail Party, Hotel Statler.
7:00 P.M.—Division Banquet, Hotel Statler (including the presentation of the Charles Goodyear Medal to Dr. Harry L. Fisher).

Wednesday Morning—May 25

9:00 A.M.—Technical Papers.
11:05 A.M.—Business Meeting.

Wednesday Afternoon—May 25

2:00 P.M.—Technical Papers.

ABSTRACTS OF PAPERS

Monday Afternoon—May 23

2:00 P. M.—Effects of Polymerization Temperature on Structure of GR-S and Polybutadiene. ***A. W. Meyer (U. S. Rubber Co., Passaic, N. J.).***

This is a review paper relating changes in polymerization temperature to influence on the structure of butadiene polymers. The percent unsaturation is near the theoretical expected for diene polymers and is little influenced by shifting the polymerization temperature or bound styrene content.

The percent 1, 2 units in polybutadiene is 20 to 25%. Polymerization temperature has a slight effect on percent 1, 2 addition possibly causing a decrease of 3 to 4% when the temperature is dropped from 50° C. to —20° C. The addition of styrene as a comonomer does not influence the ratio of 1,2 to 1,4 addition.

There is a great increase in percent *trans* 1, 4 content of butadiene polymers with decreasing polymerization temperature (50% at 100° C. vs. 80% at —20° C.). The presence of styrene as comonomer has little or no effect on percent *trans* 1, 4 addition. The refractive index of polybutadiene decreases slightly with decreasing temperature of polymerization.

Reduction in polymerization temperature increases the structural regularity of butadiene polymers. Thus, X-ray diffraction patterns of stretched polybutadiene polymerized at 20° C. and below indicate a repeat distance of 5.1 Å along the stretched polymer chains. This corresponds to a fully-extended butadiene unit in the *trans* configuration. When styrene content of copolymers reaches 20% even a —20° C. copolymer becomes amorphous. The rate of crystallization of polybutadiene is more rapid than that of natural rubber.

Polybutadiene prepared at 5° C. has T-50 values which are proportional to the amount of combined sulfur and indicate a tendency to crystallize. Polybutadiene made at 50° C. and 80 butadiene-20 styrene copolymerized at 5° C. do not give a significant T-50 value because of irregular structure. A smaller proportion of low molecular weight polymer is formed with decreasing temperature of polymerization. Osmotic and viscosity molecular weight relationships indicate that there may be less branching at low polymerization temperatures.

2:25 P. M.—The Effect of Polymerization Temperature on the Properties and Structure of Polydienes. *Paul H. Johnson (Firestone Tire & Rubber Co., Akron, Ohio).*

Low temperature, activated polymerization techniques have been applied to the polymerization of butadiene and butadiene/isoprene (75/25) copolymers, and the physical properties of these compared with polybutadiene and polyisoprene made at 50° C. in several systems.

As was the case with butadiene/styrene copolymers, an improvement in the physical properties of the polydienes attended low polymerization temperatures. A tensile strength of 2150 p.s.i. was observed on a polybutadiene made at —25° C. while 2900 p.s.i. was obtained on a butadiene/isoprene (75/25) copolymer made at —25° C. These polymers, when made in the GR-S system at 50° C., showed tensile values of 1400 and 1850 p.s.i. respectively.

The behavior of these polymers at low temperatures was examined by determining their bending modulus at temperatures ranging from 0° C. to —70° C. It was observed that the temperature of polymerization affected the low temperature characteristics. The polymers made at the lower temperatures reached a bending modulus of 10^4 p.s.i. at a much higher temperature than the corresponding polymer made at 50° C. For example, a polybutadiene made at 50° C. reached 10^4 p.s.i. at —69° C. while one made at —40° C. reached this value at —20° C.

X-Ray diffraction patterns of these polymers showed increased orientation of the molecules of polymers made at low temperatures. It is hypothesized that this phenomenon is attributable to increased linearity of the polymer chains when polymerization occurs at low temperatures.

The introduction of isoprene with its pendant methyl group reduced the temperature at which a bending modulus of 10^4 p.s.i. was reached and the low temperature copolymer behaved in this respect quite similar to those dienes polymerized at 50° C. At the same time, however, improved tensile strengths were maintained. It is concluded that at least part of the advantage from low temperature polymerization is due to increased linearity of the polymeric chains.

2:45 P. M.—Infrared Analysis of Low Temperature Polymers. *Robert R. Hampton (United States Rubber Co., Naugatuck, Conn.).*

The advent of "cold rubber" has emphasized the importance of analytical methods for studying isomerism in polymers, interest in which was first aroused by the remarkably different properties of balata, rubber, and synthetic polyisoprene. Infrared analyses of butadiene-styrene polymers show that, at temperatures of 41° F. or below, the butadiene units which enter the polymer chain by 1,4-addition, are almost entirely in the *trans* configuration, whereas, at 122° F., a considerable proportion of the *cis* isomer is also formed. The amount of 1,2-addition is not significantly affected by temperature, in emulsion polymerization, although the sodium catalyzed polymerization of butadiene is preponderantly by 1,2-addition.

Infrared methods are described for the determination of unsaturation and combined styrene. The errors inherent in the use of low molecular weight olefin standards are avoided by the use of polymer standards; sodium polymerized, high temperature emulsion polymerized, and low temperature emulsion polymerized polybutadiene samples are used, respectively, as standards for the determination of 1,2-, *cis* 1,4-, and *trans* 1,4- double bonds. By a series of successive approximations it is possible to correct for the isomeric impurities in the standards, and to accurately calculate the extinction coefficients for each of the three polybutadiene isomers.

By the use of these methods it is possible to identify standard and cold GR-S, and to measure the effects of variation in polymerization conditions, thus guiding research into the most fruitful channels.

3:05 P. M.—The Viscosity-Molecular Weight Relation for Polybutadiene: Effect of Polymerization Temperature. *B. L. Johnson and R. D. Wolfangel (Firestone Tire and Rubber Co., Akron, Ohio).*

The relation between intrinsic viscosity and number average molecular weight has been determined for polybutadiene polymerized at three temperatures. The viscosity of polybutadiene made at 50° C. is related to molecular weight as follows: $[\eta] = 72.5 \times 10^{-4} M^{0.65}$. Lowering of the polymerization temperature to 5° C. changes the relation to $[\eta] = 26.4 \times 10^{-4} M^{0.65}$, while a further decrease in polymerization temperature to —20° C. results in a relationship of $[\eta] = 10.6 \times 10^{-4} M^{0.63}$.

The increase in the exponent in the above relationship is the result of a higher intrinsic viscosity per unit molecular weight and is indicative of an increase in the average dimensions of the polybutadiene molecule as polymerization temperature is decreased. These results are in agreement with structural changes such as an increase in *trans* configuration and 1,4 addition and a decrease in branching, all of which would result in a more extended polymer molecule based on an equivalent number of butadiene units in the chain.

The high intrinsic viscosity per unit molecular weight as indicated by the larger exponent in the viscosity molecular weight relation for polybutadiene made at low temperature is a desirable characteristic in a polymer for general purpose usage since it indicates less *cis-trans* heterogeneity and more linearity in the elastomer.

3:25 P. M.—GR-S Latex Polymerized at Low Temperatures. *H. S. Smith, H. G. Werner, J. C. Madigan, and L. H. Howland (United States Rubber Co., Naugatuck, Conn.).*

Conventional GR-S latices have very poor wet strength as compared to natural latex and also cannot be obtained with high gum tensile unless low temperature stiffening characteristics are sacrificed. These shortcomings exclude GR-S latex from many applications and necessitate admixture with large proportions of natural latex in other cases. Polymerization at low temperatures results in great improvement of both of these properties without sacrifice of other desirable characteristics.

In order to obtain reasonable reaction rates at low temperature, an activator must be used with the catalyst. In initial latex work the conventional iron-pyrophosphate-sugar activation system used in dry polymer work was employed. In this case the hygroscopic properties of the sugar prevented proper drying of latex films. Although elimination of the sugar helped somewhat, the pyrophosphate is sufficiently hygroscopic to give trouble. These difficulties were eliminated by the adoption of a special activator system which not only is non-hygroscopic but also made possible a reduction in the electrolyte content of the latex.

Soaps presented another problem in low-temperature polymerization. For some reason it is difficult to obtain satisfactory films from latex made on the lower fatty acids. Thus far it has been impossible to obtain satisfactory activation of rosin soap

latices with the special activator system. However, a good compromise was reached by employing a mixture of rosin and fatty acids.

Since latex quality is impaired at conversions above 60% it is impossible to obtain solids above 50% even in the conventional high-solids type formula. Suitable methods for concentration to 60% solids are presently being investigated.

3:45 P. M.—The Use of Alternative Activators in the 41° F. Polymerization Recipes. *H. Leverne Williams (Polymer Corp., Ltd., Sarnia, Ontario, Canada).*

In two well-known 41° F. formulae, X-435 and the Phillips Custom, the pyrophosphate can be replaced by organic compounds capable of forming complexes with iron. The order of effectiveness of materials studied was ethylene dinitrilo tetra acetic acid, o-phenanthroline, a,a'-bipyridyl, nitrilo triacetic acid, citrate, salicylate, tartrate, etc. The first mentioned substance was particularly good and was the subject of a more intensive investigation.

It was found that recipes developed required remarkably little iron, less than 0.025 parts of ferrous sulfate heptahydrate being sufficient for a practical rate of conversion. In addition, the formula was reproducible and insensitive to the amount of iron, although somewhat more sensitive to the amounts of complexing agent, sugar or cumene hydroperoxide. An unexpected result was a rapid conversion with no iron at all, making it possible to prepare iron-free polymers. However, the complex seemed to be formed and to be active under conditions unfavorable for the formation of ferrous pyrophosphate.

Active complexes could be prepared with other metals, notably ferric salts, stannous, chromous, and (probably) copper and aluminum. Complexes could be prepared with many other metals too but they seemed to be inactive or even deleterious. Particularly attractive techniques were devised using an invert sugar which required no further digestion. Such a formula was scarcely more difficult to charge than the Mutual recipe.

Tuesday Morning—May 24

9:00 A. M.—Effects of Temperature of Polymerization of GR-S on the Quality of Tire Tread Stocks: A Review of Information Obtained in the Government Synthetic Rubber Program. *L. M. White (United States Rubber Co., Passaic, N. J.).*

There have been some good general papers on the effects of reducing the temperature of polymerization of GR-S type synthetic rubber presented or published previously. All of these, however, have dealt with a relatively very small amount of data, or else have discussed only in qualitative terms the effects of temperature of polymerization on the properties of GR-S. The present paper is a survey of the very large amount of information collected in the Government Synthetic Rubber Program and an attempt to establish the quantitative effects. This review is limited to GR-S types containing 20-30% bound styrene and compounded into tread type formulations.

Continual reduction of the temperature of polymerization from 50° C. (122° F.) to —10° C. (14° F.) appears to result in linear changes in most physical properties. The major advantages of reducing polymerization temperature from 50° C. to —10° C. are: Tensile strength at break, at R.T., at 212° F., and after aging, 20-30% higher; Elongation at break, at R.T., at 212° F., and after aging, 10-15% higher; Cut Growth Rate: Unaged, at least 50% lower, aged, 40% lower; Tire tread cracking rate, 50% lower; Tire tread wear, 30% better. Small improvements are made in hysteresis properties as judged by heat development and rebound tests. No change was made in the retention of tensile and elongation properties when tested at 212° F. or when tested after aging.

The only significant disadvantages noted from reducing temperature of polymerization from 50° C. to —10° C. are: Increase in the work required to mix stocks, the ratio of compound viscosity to polymer viscosity increases about 20%; "Marching modulus," increase in stress at 200% elongation on aging is 15% greater; Retention of cut growth resistance after aging, the ratio of aged to unaged cut growth resistance decreases by at least 25%.

9:25 A. M.—Cold Rubber—Its Quality and Its Adaptability to Tires. *J. H. Fielding (Goodyear Tire & Rubber Co., Akron, Ohio).*

The superiority of "cold rubber" (GR-S polymerized at 41° F.) over Standard GR-S is beyond question. GR-S is inferior to natural rubber in most respects. It has successfully replaced natural rubber in those tires and those types of service in which its deficiencies are least apparent or where its advantages are brought out. It has never, even under wartime stringency, permitted the industry to do without some amount of natural rubber. "Cold rubber" is definitely better than GR-S and is an important step in the direction matching the properties of natural rubber by chemical synthesis. "Cold rubber" is not yet the equal of natural rubber.

Factual data are presented comparing GR-S, "cold rubber" and natural rubber in the physical properties ordinarily important to a tire manufacturer. Road test data involving a sufficient number of tires to establish the position of "cold rubber" clearly are presented. Because several different carbon black types are involved, the individual contributions of polymer and black are identified.

It is apparent that tires of better wear resistance than before are possible with "cold rubber" but other deficiencies of the polymer will limit the extent to which it can replace natural rubber.

9:50 A. M.—Some Comments on Processing and Tire Service Characteristics of "Cold Rubber". *I. J. Sjothun and O. D. Cole (Firestone Tire & Rubber Co., Akron, Ohio).*

With considerable interest in "cold rubber" and the expansion of low temperature production facilities in the industry, it was thought that a summary of the passenger tire test results obtained by this laboratory would be helpful to all concerned.

Commercial "cold rubber" polymers gave 10 to 20% improvement over GR-S in tread wear. The replacement of channel by various fine furnace blacks gave an additional 10 to 30% improvement. Tread cracking resistance of "cold rubber" was at least equal if not superior to that of GR-S. Artificially aged tires also showed the low temperature polymer about equal to GR-S for aging as measured by tread wear, tread cracking and chipping. Traction on ice and snow is equal to that of GR-S from 20 to 30° F. but inferior at 0° F. Traction on wet pavement was equal. For the most part synthetic polymers were up to 15% poorer than natural rubber for traction on ice and snow, but were up to 10% better on wet pavements at temperatures above 40° F. Preliminary tests have indicated that "cold rubber" is unsuitable for large truck tires.

Low temperature polymers have generally been produced at higher viscosity levels than GR-S but have been found to be satisfactory for processing. Fine furnace blacks were an aid for providing smoother and more uniform extrusion but added to the scorching tendencies. Other processing characteristics appeared satisfactory. Building tack was no better than that of GR-S-10.

To date, the variability of the polymer has been greater than that of GR-S. Most physical properties of the low temperature polymers have fallen between those of GR-S and natural rubber. This was true particularly of tensile, elongation, heat generation, and resilience.

10:15 A. M.—A Study of Channel Type Carbon Blacks in Low Temperature GR-S. *E. M. Dannenberg and H. J. Collyer (Godfrey L. Cabot, Inc., Boston, Mass.).*

The use of channel carbon blacks in combination with the recent low temperature chemical rubbers for tires has received little attention in the published literature. This paper presents information on the properties in "cold rubber" of a variety of channel blacks covering their complete range of particle size.

Since the new high abrasion types of furnace blacks (HAF) have become well established for use in "cold rubber" it is necessary to compare the fundamental properties of the HAF blacks and channel blacks in an attempt to evaluate the determining factors in their performance. It is generally accepted that rubber reinforcement is influenced primarily by particle size. This relationship is valid for "cold rubber" and the finer channel blacks give greater reinforcement.

A medium grade of channel black (MPC) has not shown the

reinforcing ability of the HAF blacks. It has been established that these blacks are about the same in average particle size, and the reason for the difference in reinforcing ability must be attributed to other fundamental factors. Electron microscopic examination shows MPC black to be finer in average particle size and to have narrower particle size frequency distribution than HAF black. The particle size weight distribution curves of HAF and MPC blacks show even more strikingly the differences between the two types. At a given weight loading in a rubber compound the number of reinforcing particles per unit volume is significantly larger in the case of an MPC black than it is for HAF black. From such particle size distribution data it would also be anticipated that MPC black is more reinforcing than HAF black.

Evidence is presented showing that the major factor responsible for this superiority of HAF black over MPC black is in its relative freedom from chemisorbed surface oxygen, and the consequent beneficial effect on cure resulting in improved vulcanizate properties. Removal of the chemisorbed oxygen associated with channel blacks improves their curing properties in "cold rubber" and eliminates to a large degree the differences in reinforcement between HAF black and channel black of comparable particle size.

10:40 A. M.—Carbon Gel Formation in "Cold Rubber". *C. W. Sweitzer, W. C. Goodrich, and K. A. Burgess (Columbian Carbon Co., New York, N. Y.).*

Bound rubber has been described as an index to carbon reinforcement and wear in "cold rubber" treads. Experiments described in this paper show that many factors influence the development and measurement of carbon gel of which bound rubber is a part, these factors including the grade of carbon black, the type of polymer, the time of resting after mixing, and the extraction temperature. Temperature of mixing, however, is revealed as having the most pronounced effect on the formation of carbon gel, with increased temperature resulting in higher carbon gel values. Correlation between carbon gel and physical properties contributing to reinforcement are delineated.

11:00 A. M.—Pilot Plant Preparation of Chemical Rubber by a Continuous Process at Low Temperatures. *R. W. Laundrie and R. F. McCann (Government Laboratories, University of Akron, Akron, Ohio).*

The Office of Rubber Reserve recently authorized the conversion of approximately one-half of the capacity of the operating GR-S copolymer plants to the production of low-temperature polymerized GR-S. Since many of the plants are now producing standard GR-S at 117° F. by a continuous process, investigation of continuous polymerizations conducted in the pilot plant of the Government Laboratories has been spurred considerably so that suitable polymerization formulae, basic operating techniques and pertinent data may be available for future design and operation of synthetic rubber plants.

Three of the best formulations that have been developed for the batchwise preparation of chemical rubber were utilized in pilot plant runs conducted at 41° F. in a continuous polymerization unit consisting of twelve 20-gallon reactors connected in series (total capacity of 287 gallons): (1) a formula containing about 3% of commercial dextrose as the reductant, (2) a formula with approximately 1% of commercial dextrose, and (3) a formula without dextrose.

Cumene hydroperoxide as the oxidant and ferrous iron salts as the activating medium were utilized in each formulation with a monomer ratio of 72/28 butadiene/styrene, by weight. Experimental lots (5,000 to 10,000 pounds of polymer in each) were prepared and have been distributed to the various rubber companies for evaluation and factory processing tests and for comparison in tires with standard GR-S and with low temperature GR-S made by a batchwise process.

The advantages of the continuous polymerization process at low temperatures are: (a) ease of control of temperature; (b) variations in the conversion levels attained and in the Mooney viscosities of the final polymers, when adequately shortstopped, appear to be less than those encountered in batchwise low temperature polymerization; (c) the physical and chemical properties of the product, as disclosed by laboratory tests, are equal to those of similar polymer prepared batchwise.

11:20 A. M.—Low Temperature Polymerizations: Emulsifiers of the Alkyl Aromatic Sulfonate Type. *W. A. Schulze, C. M. Tucker, and W. W. Crouch (Phillips Petroleum Co., Bartlesville, Okla.).*

One of the important factors in the emulsion polymerization process for the production of low temperature GR-S is the type and amount of emulsifier used. Laboratory and pilot plant studies now have been made in which salts of alkyl aromatic sulfonates have been used for that purpose in redox recipes at 41° F., employing peroxidic catalysts, and aged ferropyrophosphate activators. Salts of long-chain alkylbenzene sulfonates, of the type now widely used in many of the new synthetic household detergents, were found to be very satisfactory from the standpoint of promoting rapid polymerization rates to give fluid latices of satisfactory stability. With most of the commercial products of this type, however, treatment to remove inorganic salts, unsulfonated hydrocarbons and other impurities is required for best results.

It is of particular interest that salts of alkyl aromatic sulfonates function effectively in concentrations much lower than can be employed with the usual emulsifiers. Very satisfactory results were obtained, particularly by use of highly active experimental catalysts such as Diox, in recipes in which the charge of emulsifier was reduced from 5.0 down to as low as 0.50 part. Also, the process is believed to have promise for use in the preparation of special latices or for producing polymers of controlled organic acid contents.

11:40 A. M.—Non-Aqueous Emulsion Polymerization Systems. *E. Carr and P. H. Johnson (Firestone Tire & Rubber Co., Akron, Ohio).*

Formamide was tried as antifreeze for low temperature polymerization at —10° C. in an MP-189-S emulsified, benzoyl peroxide-sugar redox recipe. The rate of polymerization was considerably lower than for the corresponding recipe with methanol antifreeze. The unmodified polymer of 32% conversion showed satisfactory breakdown characteristics when milled ten passes on a cold mill.

Formamide was also investigated as a water-free emulsion polymerization medium. Its application in this field had been indicated by work of Carothers [U. S. Patent 2,080,558 (1937)], and in the present work was extended to the emulsion copolymerization of butadiene and styrene and the homopolymerization of vinyl monomers. It was found that polymerization proceeded readily in this medium, by an emulsion mechanism, as evidenced by the formation of a latex, using a persulfate-mercaptan recipe. The latex was similar to a water latex in general characteristics. The rate of polymerization in formamide (72% conversion in 26.5 hrs.) was somewhat lower than in the water system (72% conversion in 12 hrs.). The rate was increased somewhat by adding some acrylonitrile. Attempts to accelerate the rate by the use of a diazothioether gave negative results.

A high solids latex of butadiene/styrene 75/25 was prepared in formamide. The conversion reached 100% in 48 hours. The latex was very viscous. The butadiene/styrene copolymer obtained in the system was similar to GR-S. Exploratory experiments were performed with the objective of adapting liquid ammonia to emulsion polymerization. Liquid ammonia was completely substituted for water in a workable aqueous recipe utilizing butadiene and styrene as comonomers. At the lowest bath temperature employed (—24° C.) the monomers were miscible with liquid ammonia, thus presumably precluding an emulsion polymerization mechanism. This recipe gave no evidence of polymerization in 41 hrs. at —24° C. At somewhat lower temperatures a two-phase system can be established, and future work will be aimed at effecting emulsion polymerization in such liquid ammonia recipes.

Formic acid was tested as an emulsion polymerization system, using recipe components commonly effective in water. Polymerization could not be initiated in this medium, however, by the means employed.

Wednesday Morning—May 25

9:00 A. M.—Peptization of Low Temperature GR-S. *E. L. Stangor and R. R. Radcliff (E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.).*

The factory processing of low temperature GR-S polymers, such as X-432, X-478 and X-485, is more difficult than that of standard GR-S due to the lack of breakdown when the polymer is masticated under normal conditions on a mill or in a Banbury. When the mastication is carried out in the presence of an aromatic mercaptan or combinations of mercaptan and diphenyl-para-phenylene-diamine the results obtained depend upon: (1) the temperature of mastication, (2) the time of mastication, and (3) the concentration of peptizing agent employed.

Data are presented showing the results obtained in a laboratory Banbury when each of these three factors is varied. Based upon Mooney viscosity values, the data show that increasing the time of breakdown, particularly at high temperatures, generally results in a toughening of the elastomer. The addition of small amounts of an aromatic mercaptan will not overcome this effect and, in fact, will sometimes enhance it. The best results (greatest amount of softening) are obtained when quantities of mercaptan approaching 1.0 part per 100.0 parts of elastomer are used and mastication is carried out for a period of approximately 5 minutes at a temperature below 350° F.

9:20 A. M.—Physical Evaluation of Foamed Latex Sponge. ***F. S. Conant and L. A. Wohler (Firestone Tire and Rubber Co., Akron, Ohio).***

Testing methods are described for evaluation of tensile strength, compression modulus and fatigue resistance of foamed latex sponge. Quality indices based on tensile strength and on compression characteristics are discussed. Compression modulus vs. percent compression curves are shown to be parabolic, implying that the principal mechanism of compression of foamed latex sponge is a buckling of the cell wall remnants. An application of the evaluation methods to studying the effect of maturation time of raw Hevea compound is given. Effects of density on the physical properties of Hevea, 50 Hevea/50 GR-S, and neoprene foamed latices are given. A physical basis is postulated for the greater comfort of sponge rubber cushions as compared to coil steel spring cushions.

9:50 A. M.—Molding and Casting Processes Using Rubber Latex. ***S. C. Stokes (British Rubber Producers Research Association, Welwyn Garden City, England).***

The literature on the subject of molding and casting latex in porous and nonporous (metal) molds is reviewed. These methods date back many years, but there are recent developments for example in the field of heat sensitized latex and reference is made to the French work with artificially aged latex, and the use of Igevin M-50 by the Germans.

The advantages and disadvantages of all the established methods are discussed by way of introduction to a detailed description of the production of articles of several types from porous molds.

The technique of the manufacture of hollow articles from latex using plaster molds is described, with particular reference to the production of toys of pure gum and figures for advertising, display, and educational purposes using loaded latices to give hard models. Both soft and hard articles can be surface painted to give attractive finishes.

There are certain advantages in using latex for hard figures in comparison with papier mache or plaster of Paris, and the comparative simplicity of the operation enables the papier mache figure manufacturer to change over to latex with but little alteration to plant, etc.

Mention is made of the use of latex-rubber molds for casting models of plaster or resin, and the comparison of such molds with those prepared from "fluid rubber." Both types of rubber molds have certain advantages over those made from gelatine, and also over the more recently developed plastic molds.

10:15 A. M.—An Accelerated Weathering Test for Elastomers. ***W. E. Phillips (B. F. Goodrich Co., Akron, Ohio).***

The rate of weathering of stretched or looped 1 x 6 x .094-inch samples mounted on boards as specified by ASTM-D518-44, was found to be very slow and the results difficult to evaluate. A new accelerated static weathering test was developed in which the samples were mounted over a metal reflector for the purpose of exposing the back and front of the samples to sunlight simultaneously. The thickness of the samples was also reduced from .094-inch to .020-inch, which accelerated the rate of tensile loss on weathering of stretched dumbbells by about 15 times. This corresponds to doubling the rate of deterioration for each reduction in thickness of .019-inch. As the weathering resistance is improved it is proposed to reduce the thickness of the samples.

The rate of weathering can be evaluated much more accurately by physical tests such as stress-strain than by observation of the appearance of the sample. Several samples which were equally cracked after weathering showed wide variations in the rate of tensile loss. Other samples which showed no surface cracking also had different rates of tensile loss on weathering. Other physical and chemical tests are suggested for use in combination with this method of exposing samples for evaluating the rate of weathering. Methods are suggested for separating the effects of light, ozone and oxygen as factors in weathering.

Charts and tables are presented showing the results of weathering of the following stretched (20%) and unstretched samples: (1) Natural rubber containing 20 and 40 volumes of different grades of whiting, (2) Blends of natural rubber with GR-S and nitrile rubbers, and (3) Whiting and clay-loaded natural rubber compounds containing different age registers.

10:40 A. M.—A Comparison of Some Reclaimed Rubbers. ***H. A. Winkelmann (Dryden Rubber Div., Sheller Manufacturing Corp., Chicago, Ill.).***

The use of GR-S in tires has necessitated changes in methods of reclaiming tire scrap. The alkali reclaiming process is largely superseded by some of the neutral processes.

A comparison has been made between commercial whole tire alkali and neutral process reclaims to determine what effect, if any, a modification in the reclaiming process may have on certain physical properties of rubber compounds. The reclaims were tested in the standard reclaim test compound and in a rubber compound in which 40 parts natural rubber was replaced by reclaimed rubber hydrocarbon. Water absorption, resilience, compression set, low temperature brittleness, and flexing tests were made in addition to the usual physical tests before and after oven aging. Tests of reclaims in the reclaim test compound show considerable variation. Some alkali and neutral reclaims give equivalent results, while others do not. In the natural rubber compound the alkali reclaims give higher water absorption, higher resilience, greater resistance to flex cracking, and lower torsional hysteresis, whereas the neutral reclaims give lower compression set and better low temperature characteristics.

These results indicate that reclaims are available or may be made which impart properties to rubber compounds that are of vital interest to the rubber technologist.

11:20 A. M.—Hysteresis Determinations with the Goodyear-Roelig Machine. ***C. S. Wilkinson, Jr., and S. D. Gehman (Goodyear Tire and Rubber Co., Akron, Ohio).***

A description is given of a Roelig type of testing machine in which the test piece, under compression loading, was mechanically oscillated by means of a continuously adjustable eccentric weight rotated by a variable speed motor. The hysteresis loop was traced by means of a light beam deflected by a system of optical levers in connection with a dynamometer. Photographic recording was advantageous although the loops may also be traced on paper. The machine was found to be versatile for the selection of combinations of conditions such as frequency, force, and amplitude over the operating range. Temperature rise during some of the tests was measured by means of a needle thermocouple to compare with hysteresis values from the loop.

The effects of operational variables were investigated. These include duration of the test, frequency, and static and dynamic load. Data were secured for hysteresis determinations for synthetic polymers and Hevea compounds. Tests on the same compounds were made by other methods of hysteresis evaluation. Determinations with the Goodyear Vibrotester, rebound pendulum and flexometers were compared with results from the Roelig machine. Differences in the results could be reasonably interpreted on the basis of the different conditions of measurement and calculation. The importance of understanding the significance of a particular method of hysteresis determination for any specific application is thereby emphasized.

11:40 A. M.—A Constant Stress Method for Elongation of Soft Polymeric Materials. *C. A. Dahlquist, J. O. Hendricks, and N. W. Taylor (Minnesota Mining and Manufacturing Co., St. Paul, Minn.).*

In the study of long range elastic properties of soft polymeric materials the investigators designed an apparatus for maintaining constant stress on films during elongation. This is accomplished by means of a weight in the shape of an hyperboloid. As the film stretches the weight is lowered into a liquid, and buoyancy reduces the load in proportion to the change in cross sectional area of the test specimen, thereby maintaining constant unit stress.

Data on such materials as natural rubber, GR-S, Vistanex, Hycar OR-25, Hycar PA, polymethyl acrylate, and polyvinyl acetate are presented. Creep curves have been fitted by equations of the form.

$$E = I + L_1 (1-e^{-k1t}) + L_2 (1-e^{-k2t}) \ldots\ldots\ldots + k_v t$$

where E is the elongation at time t,

I is the "instantaneous" elongation,

$L(1-e^{-kt})$ terms are delayed elastic processes having different relaxation times, and

$k_v t$ is viscous flow.

It was found that elastic elongation in the time range of 0.03 to 1000 minutes could be closely approximated by equations containing four to six relaxation terms. When means were provided for recording elongation from zero time the initial elongation previously included in the I term could also be represented by relaxation processes. It is likely that any creep curve could be approximated very closely with six to ten relaxation terms even though a very large number of delayed elastic processes are involved. Due to inertia of the load and oscillations in the 0 to 0.01 minute range the method does not permit determination of an "instantaneous" elongation.

Recovery of the films was measured and found to be dependent on duration of stress. Films elongated for twenty-four hours continued to show slow recovery after two months. Highly delayed elasticity was therefore very difficult to distinguish from true viscous flow.

Curves showing change in modulus with time of elongation in the range 0.01 minute to 10 minutes appear to have the most practical value. They have been especially useful in evaluation of plasticized gum rubber compounds too soft to be tested by commercial tensile testing machines.

Wednesday Afternoon—May 25

2:00 P. M.—Practical Aspects of Factory Scorch Control. *D. Chalmers (Gates Rubber Co., Denver, Colorado).*

Losses related to scorching in factory operations have been a common industry problem since the advent of organic acceleration. There are reviewed highlights of literature treatment of this problem with respect to methods of measurement, processing precautions, and formulations.

Renewed interest is justified in this problem because of the rapid return to scorchier natural rubber stocks, higher processing speeds, increased dynamic requirements, compounds necessitating tighter cures, and the introduction of fast curing blacks.

This paper describes a factory scale program—an approach notably lacking in existing publications. It covers the manner of selecting one of the many methods of scorch testing. Useful approximations for minimum necessary resistance to scorching are supported by data on practical factory compounds processed in volume on a factory scale.

Interesting further correlations are presented on the dollar cost of scorching performance. These permit examples of approaching the problem of scorch prevention and control by economic reasoning.

There is summarized the respective contribution of compounders, process and mechanical engineers, supervision, and chemical suppliers.

2:20 P. M.—A New Vulcanization Process Replacement of Zinc Oxide by Use of Oxidizing Agents. *B. C. Barton (U. S. Rubber Co., Passaic, N. J.).*

A new vulcanization process has been discovered in which various mild oxidizing agents such as 2,2'-dibenzothiazyl disulfide, N-nitrosodiphenylamine, and quinone-bisphenylimine replace much of the sulfur and all of the zinc oxide and fatty acid of conventional accelerated sulfur compounds.

Rubber compounds containing no zinc oxide were not uncommon before the advent of organic accelerators. However, in these compounds relatively large amounts of sulfur were required for desirable physical properties. With the development of modern accelerators, the use of zinc oxide, together with greatly reduced sulfur concentration, became the universal practice. When zinc oxide is not present in these low sulfur compounds little or no vulcanization occurs.

A simplified mechanism is described in which vulcanization of conventional accelerated compounds containing zinc oxide is shown to be a two step oxidation process in which zinc oxide or zinc soaps function through their ability to form zinc mercaptides which are more readily oxidized by sulfur to disulfide crosslinks than are thiol groups.

Consideration of this mechanism has led to replacement of all of the zinc oxide and that portion of the sulfur taking part in the second step of the vulcanization reaction by certain mild oxidizing agents. Well vulcanized stocks can be obtained with considerably less sulfur than is used in conventional zinc oxide compounds.

The mechanism of vulcanization of the new system is discussed in some detail.

2:45 P. M.—Comparison of Properties of Butadiene and Isoprene Polymers Prepared by Alfin and Emulsion Processes. *J. D. D'Ianni, F. J. Naples and J. E. Field (Goodyear Tire & Rubber Co., Akron, Ohio).*

A series of synthetic rubbers (polybutadiene, butadiene-styrene copolymers 90-10, 80-20, 70-30, and polyisoprene) was prepared by the conventional emulsion polymerization process used for GR-S. For comparison a similar series was prepared in pentane solution with an Alfin catalyst (a complex of sodium isopropoxide and allyl sodium) discovered by Prof. A. A. Morton (Massachusetts Institute of Technology). Use of the Alfin catalyst resulted in an extremely rapid rate of polymerization and gave 65 to 90% yield of polymer in 30 minutes at 30° C.

In a detailed study of the physical characteristics, it was found that, compared to the corresponding emulsion polymer, the Alfin polymer was of much higher average molecular weight (as measured by inherent viscosity), had a higher gel content, contained substantially more external double bonds (as determined by perbenzoic acid titration), and showed lower values for density and refractive index. Infra-red absorption studies confirmed the evidence above for a higher percentage of external double bonds in the Alfin polymers, and also indicated a greater proportion of the *trans*-configuration around the internal double bonds than in the emulsion polymers. X-ray diffraction patterns showed a crystalline component in the structure of Alfin polybutadiene, the amount of which decreased with increasing styrene content. In contrast, Alfin polyisoprene and all the emulsion polymers gave amorphous X-ray diffraction patterns under the conditions of test.

3:05 P. M.—The Control of Crystallization in Neoprene. *L. R. Mayo (E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.).*

The ability of the general purpose neoprenes to crystallize under conditions of stress, or exposure to favorable temperatures, results in patterns of behavior which may or may not be desirable depending on the practical application involved.

Properties which may vary with the degree of crystallization include: (1) Tensile strength, (2) Shape of stress-strain curve, (3) Rate of stiffening in cured and uncured stock, and (4) Stress and compression set at low temperatures. It is obviously desirable to be able to control variations in such properties, since they may significantly influence both processing characteristics in vulcanizate properties.

Means by which crystallization may be controlled include: (1) Variation in state of cure, (2) Addition of specific softeners, (3) Use of sulfur as a curing agent, and (4) Copolymerization of a second monomer during manufacture of the elastomer. The relative advantages and limitations of these methods are discussed and qualitative explanations of the mechanisms involved are offered. The application of these methods individually, or in combination, to the solution of specific problems deriving from the crystallization of neoprene is illustrated.

Editorials . . . . . .

Disposal Recommendations

UNDER the terms of the Rubber Act of 1948 (Public Law 469), a report with respect to the development of a disposal program for the government-owned synthetic rubber plants "shall be made to the President and to Congress not later than April 1, 1949." The Act further specifies that the President, on or before January 15, 1950, after consultation with the National Security Resources Board "shall recommend to the Congress legislation with respect to the disposal" of such plants. In accordance with the law, the Reconstruction Finance Corporation has submitted a disposal plan to both President Truman and to the 81st Congress.

In submitting the recommendation, RFC made it plain that in its present form the program is only "discussive," despite the fact that it is the product of a committee of representatives of the seven governmental executive departments, the National Security Resources Board, and various groups representing the rubber, chemical and petroleum industries. It contemplates the sale of the synthetic plants at their "fair value," either for cash or on terms. In either case, it is designed to prevent windfalls to purchasers and to assure a fair return to the government.

The plan further proposes the transfer in six months of all facilities for which negotiations have been completed. The President, upon authorization from the Congress, would designate a disposal agency, and 30 days later proposals from bidders would be accepted. Provision is made for the sale of facilities and prices "directly related to their actual functional use to safeguard the government" as well as for a method of purchase for private industry that will not involve the assumption of "extraordinary risks." It is quite evident from these provisions that industry has received as much attention as has government in the recommendation.

To most prospective purchasers, the definition of "fair value" as applied to the synthetic plants will be most important. The proposed program defines "fair value" as "that determined by a physical appraisal to fix replacement costs related to the construction of a new facility for similar production and by the assumption of highest and best use." In view of the intricacies of costs which went into the construction, under pressure, of the government synthetic facilities the definition should prove quite acceptable to prospective purchasers.

Whether disposal by sale or by lease is effected, the program provides for equal opportunity to acquire the government-owned facilities. Reasonable assurance that the buyer is financially responsible will, of course, be expected, as well as safeguards to prevent arbitrary determinations of the buyer. Disposal of units will naturally be tied in with mandatory consumption requirements, probably on a sliding scale.

Pressure on Prices

AS EXPECTED, considerable pressure was brought by rubber-producing countries during the meeting of the International Rubber Study Group in London early this month to have some action taken on increasing the price of natural rubber. An intimation of such pressure was given in advance reports of a recommendation submitted to the Group for consideration by the Malayan Rubber Advisory Committee. Since the Rubber Study Group can make recommendations only to the member governments, no possible "action" could be taken at the meeting.

The possibility of a revived restriction scheme, even with the United States as a partner in such a scheme, due to its position as the No. 1 producer of synthetic rubber, is abhorrent to the American rubber manufacturer. Restriction of any kind, even if it carries some definite advantages, such as price stabilization in the case of rubber regulation, is anathema to the average American manufacturer, and all of his instincts are against it. If rubber prices are to be strengthened and increased, some other solution will have to be found.

CURRENT NEWS OF THE MONTH

SIXTH STUDY GROUP MEETING HELD IN LONDON, ENGLAND

The sixth meeting of the International Rubber Study Group was held in London, England, the week of March 28. The group includes fifteen nations as permanent members, in addition to which delegates of non-member countries are permitted to attend the meetings. Several such delegates were present at the London meeting.

As a result of the London sessions, the group predicted a potential world surplus of 125,000 long tons of natural rubber by the end of the current year. This figure does not include any rubber secured by any nation, particularly the United States, for stockpiling purposes. World production of natural rubber for 1949 was put by the group at 1,575,000 tons (as against 1,515,000 in 1948) and world consumption at 1,450,000 (as against 1,407,000 in 1948). No estimate of U. S. production of synthetic rubber was made, but it is expected to be approximately 450,000 long tons.

Principal amounts making up the 1,575,000 tons of natural rubber expected in 1949 include 700,000 tons from Malaya, 500,000 tons from Indonesia, and 90,000 tons from Ceylon. P. H. Westermann, leader of the Dutch delegation, said that both lower prices for consumption goods and a better price for rubber were essential before Indonesian output expanded. The 500,000 ton estimate was based on "reasonably" political stability in Indonesia during the year.

Specific Estimates Made

The Rubber Study Group's estimate of 1949 consumption (in thousands of long tons) was as follows:

	Natural	Synthetic*	Total
United States	600	410	1,010
United Kingdom ...	183	2	185
France	97	8	105
Netherlands	10	a	10
Belgium	15	a	15
Czechoslovakia	30	—	30
Italy	33	3	36
Denmark	5	a	5
Hungary	3	—	3
Canada	40	20	60
Australia	30	a	30
Other countries	404	7	411
	1,450	450	1,900

* Excluding Russian-produced synthetic rubber.
a A small amount is expected to be used.

It is understood that considerable pressure was exerted by Malaya, Ceylon and other rubber producing countries to get some action on increasing the price of rubber. Since the Rubber Study Group is an advisory group only, no action could of course be taken during the meeting itself. One delegate, however, V. Coomaraswamy, of Ceylon, warned that "if nothing comes of our efforts to raise the price, producer countries will have to consider combining together to see what can be done."

Sir Gerard Clauson, who headed the British colonial delegation and who presided at the meeting, intimated there had been "no serious discussion" about the necessity for a restrictive international agreement on rubber. He stated that it had been mentioned in the course of conversations, but no action of any kind was taken.

In a memorandum submitted to the meeting, the Malayan Rubber Advisory Committee urged the United States to permit free competition between natural and synthetic rubber and to make larger stockpile purchases of natural rubber. The memorandum also urged that the United States Government drop the compulsory minimum use of a percentage of synthetic rubber in tire manufacture.

Questioned on this memorandum, D. D. Kennedy, chief, Division of International Resources, Department of State, who headed the American delegation, insisted there was free competition between natural and synthetic rubber "over a wide area of rubber usage in the United States." He emphasized the point that the government was not subsidizing synthetic rubber, since it was sold at 18.06c a pound in the 1947-48 fiscal year against an all-in cost of 18.01c a pound. Mr. Kennedy was noncommittal on the subject of stockpiling.

At the conclusion of the London sessions, it was intimated that the Rubber Study Group may not meet again until some time during the second quarter of 1950.

Data on Clambake

As reported elsewhere in this issue, one of the features of the meeting of the Rubber Division, A.C.S., to be held in Boston, Mass., from May 23 to 25, will be a clambake at Marblehead, Mass. The clambake will be held on the evening of May 23, and will be limited to 500 people. Tickets are $5.50 each, including gratuities. In addition, there will be a transportation charge of $1.00 to and from Marblehead, including tax. Reservations for the clambake must be made prior to the meeting and will be accepted up to May 18 only. Reservations should be made with H. W. Sutton, c/o Boston Woven Hose & Rubber Co., Cambridge, Mass. The clambake will be strictly a stag affair.

NORWALK TIRE STOCKHOLDERS REJECT REFINANCING PROGRAM

Stockholders of the Norwalk Tire & Rubber Co., at two meetings held in Norwalk, Conn., on March 28 and April 4, respectively, turned down flatly two matters concerning the company's proposed refinancing program. These were a proposal which would have empowered the present officers to execute a mortgage or otherwise pledge the assets of the company for a sum not to exceed $750,000, and a contingent matter proposing to authorize the officers to increase the common stock from 315,000 to 500,000 shares.

Show Cause Order Filed

In the interim a show cause order was filed by the T. A. Maguire Co., of New York, in Superior Court, Bridgeport, Conn. The Maguire concern, which is controlled by Elliott E. Simpson, seeks to remove the present Norwalk Tire management on the grounds that an election of directors last January was "illegal" and that the stockholders were not properly notified that the company was in default on certain bond issues.

Specifically, the suit asks for an injunction to restrain the company from increasing its capital stock or mortgaging its property, as well as a judgment declaring void the elections of directors. According to Mr. Simpson, present officers of Norwalk Tire control only 550 shares of stock, while he and his wife alone control more than 10% of the common stock.

Seeks Complete Reorganization

In filing the Maguire suit and in leading the stockholders' fight against the proposed refinancing program, Mr. Simpson made it plain that he is seeking complete reorganization of Norwalk Tire's present management. He indicated that he had no desire to oust president John W. Whitehead, who he said was "a very sick man," but would leave it to a duly elected board to pick its own head. Mr. Whitehead, who has been president of the company for the past 20 years, has been on leave of absence for several weeks, most of which were spent in a hospital in Florida.

Norwalk Tire's present difficulty came to light a few months back when the New York Trust Co. called attention to the fact that the company had fallen considerably behind in its payment of excise taxes to the government. The company subsequently appealed to the R.F.C. for a $500,000 loan, which has since been approved.

Holders of debentures were scheduled to meet on April 11 in New York to vote on acceptance of this loan. If accepted, the company plans to use $205,696 to pay back excise taxes and would add the balance to working capital.

CASING SHIPMENTS IN JANUARY DECLINE 2.89% FROM DECEMBER

Manufacturers' shipments of passenger casings for the month of January, totaled 4,249,036 units, a decline of 1.65% from December when the shipments totaled 4,320,195 units, the Rubber Manufacturers Association reported recently. Truck and bus casings shipped during January amounted to 1,036,367 units against the 1,122,331 units shipped in December. Total automotive casings shipped during January totaled 5,285,403, a decline of 2.89% from December when 5,442,526 casings were shipped.

Automotive casings produced during January amounted to 5,895,936, which compares with the 5,715,055 casings produced in December. Of the total produced during January, 4,772,116 casings were passenger and 1,123,820 were truck and bus casings. In December, 4,609,669 passenger casings and 1,105,386 truck and bus casings were produced.

Total passenger and truck and bus tubes produced during January amounted to 5,062,357, compared with 5,033,856 units produced during December. During December, 4,722,364 truck and bus and passenger tubes were shipped, against 4,925,547 tubes shipped during January. Manufacturers' inventories as of January 31 stood at 9,814,837 tubes, compared with 9,734,490 tubes on hand at the end of December.

Fine Titanium Pigment Producers

The Federal Court in New York City recently imposed fines totaling $43,000 against the National Lead Co., E. I. du Pont de Nemours & Co., Titan Co., Inc., and three individuals following their pleas of nolo contendere to an indictment charging violations of the Sherman Anti-Trust Act with respect to titanium pigments. The indictment charged the defendants and a number of foreign concerns with engaging in a world-wide cartel designed to eliminate competition in the manufacture and sale of titanium pigments throughout the world, including the United States. Fines imposed ranged from $5,000 for the individuals involved, all executives of National Lead, to $10,000 for the corporations. Titan Co. is an affiliate of National Lead.

February Consumption Drops 7%

Consumption of new rubber during the month of February totaled 81,598 long tons, according to the Rubber Manufacturers Association. This was about 7% less than the January consumption of 87,756 tons. Use of natural rubber declined 8.17% during February to 46,140 long tons from 50,246 tons the previous month. Consumption of synthetic rubber declined less sharply to 35,458 tons from 37,510 in January, a reduction of 5.47%. Consumption of reclaimed rubber also declined in February to 19,624 long tons from 21,103 tons in January.

An Index to Volume 64 of RUBBER AGE will be found on Pages 113 to 116 of this issue.

SPOERL, GARTRELL AND ARMSTRONG PROMOTED AT U. S. RUBBER

W. F. Spoerl R. D. Gartrell W. A. Armstrong

Three major staff promotions in the Mechanical Goods, General Products and Rubber Thread Divisions of the U. S. Rubber Co., were announced recently by Ernest G. Brown, vice-president and general manager of the divisions. Walter F. Spoerl, formerly general sales manager of the Mechanical Goods Division, was named general sales manager for all the divisions under Mr. Brown's supervision. Robert D. Gartrell, formerly development manager for the company's Passaic, N. J., plant, has been named development manager for all three divisions. Wesley A. Armstrong, factory manager of the company's Bristol, R. I., plant, has been appointed production manager for the three divisions.

Mr. Spoerl began his rubber career 40 years ago as a clerk in U. S. Rubber's sales office in Chicago, Ill. He transferred to New York in 1934 as assistant manager, branch sales, mechanical goods. He became merchandise manager of the Mechanical Goods Division in 1944. In 1946, he was named general sales manager for the Division, the position he held until his new appointment.

Mr. Gartrell joined Dominion Rubber Co., Ltd., Canadian subsidiary of U. S. Rubber, in 1917, shortly after receiving his degree in chemistry from the Georgia School of Technology. For the next 11 years he served in various technical positions until he was appointed director of development for Dominion. He returned to the United States in 1934 to become development manager of the Passaic, N. J., plant of U. S. Rubber, a position he held for the past 18 years.

Wesley A. Armstrong received his degree in mechanical engineering from Rensselaer Polytechnic Institute in 1922. After 13 years of consulting work in industrial engineering, sales and production, he joined U. S. Rubber as production superintendent at the company's Bristol, R. I., plant. In 1939 he was named assistant factory manager of the plant and in 1941 factory manager, the position he held until his present appointment.

Revise Synthetic Specifications

The Office of Rubber Reserve of the Reconstruction Finance Corporation, 811 Vermont Ave., Washington 25, D. C., has issued a new revised edition of the "Specifications for Government Synthetic Rubbers." These specifications are issued upon the request and with the approval of the Committee on Specifications for Synthetic Rubbers and revisions and additions are issued from time to time based on the continuing study for specifications and test methods conducted by that committee. Copies of the revised specifications can be secured from the Office of Rubber Reserve on request.

Eclat Moves Offices to New Site

Eclat Rubber Co. is in the process of dismantling its old plant in Cuyahoga Falls, Ohio, following completion of its new, two-story plant in Cuyahoga Falls. The new plant is reported to have cost $60,000. J. E. Smith, president of the company, said that the new building gives the plant a modern shipping room and will provide more manufacturing space in the future.

Pliolite S-5 in Road Paints

A highway marking paint for all types of improved roads which is capable of withstanding a wide range in weather conditions and traffic flow, is the latest use for a synthetic rubber resin produced by the Goodyear Tire & Rubber Co. Pliolite S-5, a high styrene-butadiene copolymer resin, is used in the highway paint formulations. Spraying of the paint is accomplished with little or no bleeding, and the product has good penetration through dirt and grime. Such penetration, combined with the paint's ability to bite and anchor, results in tough, long-wearing films.

Data On Odorless Rubber

The current issue of the *Sindar Reporter* (No. 1, 1949), house organ of the Sindar Corporation, 330 West 42nd St., New York 18, N. Y. is devoted to a fairly comprehensive discussion of the applications of the various Paradors in numerous rubber products. Among products discussed are bathing caps, baby items, rubber footwear, household commodities, and clothing. Copies of the issue can be secured without cost on direct request to the company.

BRANDT AND DUDLEY ADDRESS CHICAGO TECHNICAL MEETING

The March 25 meeting of the Chicago Rubber Group held at the Morrison Hotel, Chicago, Ill., was attended by approximately 100 members and guests. The afternoon session featured two papers, one presented by Allyn I. Brandt, general sales manager of the B. F. Goodrich Chemical Co., Cleveland, Ohio, and the other by John C. Dudley, of the Rubber and Plastics Laboratory of the Chrysler Corp., Detroit, Mich. Mr. Brandt spoke on the subject "Selling to the Rubber Industry," and Mr. Dudley spoke on "Automotive Mechanical Goods."

Mr. Brandt noted the great improvement over a period of years in the methods of selling raw materials to the rubber industry. He outlined his talk with many humorous, personal observations. The periods covered were the days of extreme secrecy up to World War I, the gradual introduction of competent technical selling from 1918 to 1930, and the great expansion of technical information from 1930 to 1940. The war period was realistically called the "sales prevention period."

Gradually the suppliers to the rubber industry expanded their sales service laboratories and their printing presses to the point where the basic public information on rubber compounding materials is the best information available today on any raw materials in any industry in the country. The speaker then raised the controversial point that perhaps there is too much detailed and expensive information published today.

Accountants, he said, have a way of charging all this service work to the cost of production and while, on the surface, the information may be furnished free, the cost is nevertheless in the cost of the materials sold. Mr. Brandt predicted that perhaps the pendulum was now swinging in the other direction and that some of the detailed expensive work on individual problems would be reduced in the future of selling to the rubber industry.

Automotive Mechanical Goods

John C. Dudley, in his address, stated that rubber in the modern motor car carries more of its proportion of load and safety than is indicated by its weight. In 1936 the average car contained 145 pounds of rubber; in 1939, 176 pounds of rubber; and in 1941, 198 pounds of rubber. The automotive industry uses over 2,000 parts obtained from 375 sources. Including tires and tubes, the automotive industry consumes 70 to 80% of the rubber output.

The unique range of properties of rubber obtained by appropriate compounding has given added incentive to the engineer in his design of new cars which, in turn, has created a demand for newer properties from the rubber. At present, rubber gaskets and windshield wipers are some of the few mechanical rubber materials which are not as good as the automotive engineer would like them to be. Mr. Dudley said that plastics are now entering the automotive industry and predicted that they will eventually displace some of the parts now made of rubber.

The evening session featured the colored movie entitled "King Spruce," depicting scenes of logging operations and the preparation of pulpwood. William Gilman, pulp sales manager of the Brown Co., who was to have discussed logging operations in connection with the showing of the film, was unable to appear.

Coming Events

Apr. 21. R. I. Rubber Club, Metacomet Golf Club, East Providence, R. I.

May 6. Detroit Rubber Group, Detroit-Leland Hotel, Detroit, Mich.

May 6. Buffalo and Ontario Rubber Groups, Joint Meeting, General Brock Hotel, Niagara Falls, Ont.

May 20. Chicago Rubber Group, Morrison Hotel, Chicago, Ill.

May 21. Southern Ohio Rubber Group. (Tentative).

May 23-25. Rubber Division, A. C. S., Statler Hotel, Boston, Mass.

June 4. Southern Ohio Rubber Group, Outing, Edelweiss Park, Dayton, Ohio.

June 16. New York Rubber Group, Outing, Doerr's Grove, Millburn, N. J.

June 17. Akron Rubber Group, Outing.

June 24. Detroit Rubber Group, Outing, Golf Tournament.

June 24. Boston Rubber Group, Outing, United Shoe Country Club, Beverly, Mass.

July 30. Buffalo Rubber Group, Outing, Lancaster Country Club, Buffalo, N. Y.

Sept. 18-23. American Chemical Society, 116th National Meeting, Atlantic City, N. J.

Sept. 22. Southern Ohio Rubber Group. Engineer's Club, Dayton, Ohio.

Oct. 7. Detroit Rubber Group, Detroit-Leland Hotel, Detroit, Mich.

Oct. 10-14. A.S.T.M., West Coast Meeting, Fairmont Hotel, San Francisco, Calif.

Oct. 14. Boston Rubber Group, Somerset Hotel, Boston, Mass.

Oct. 21. N. Y. Rubber Group, Henry Hudson Hotel, New York City.

Dec. 9. Detroit Rubber Group, Detroit-Leland Hotel, Detroit, Mich.

Dec. 10. Southern Ohio Rubber Group, Miami Valley Golf Club, Dayton, Ohio.

Dec. 16. N. Y. Rubber Group, Henry Hudson Hotel, New York City.

Dec. 16. Boston Rubber Group, Somerset Hotel, Boston, Mass.

Boston Plans Summer Outing

The Boston Rubber Group will hold its annual summer outing at the United Shoe Country Club, Beverly, Mass., on June 24. John Andrews (Cabot) is chairman of the Outing Committee.

CHASE AND THIESSEN ADDRESS BOSTON RUBBER GROUP MEETING

Approximately 325 members and guests attended the March 25 meeting of th Boston Rubber Group held at the Somerset Hotel, Boston, Mass. Donald C. Chase, manager of the Rubber and Plastics Division of the Farrel-Birmingham Co., Ansonia, Conn., spoke on "Modern Machinery for Rubber and Plastics." Dr. Gilbert Thiessen, technical advisor, Chemical Division, Koppers Co., Inc., Pittsburgh, Penna., addressed the group on "Plastics and Elastomers! Whence the Raw Materials."

In his talk, Mr. Chase offered a general discussion, accompanied by slides showing a number of machines made by Farrel-Birmingham for the rubber and plastics industry. It was apparent, he said, from a review of these latest units, that the speeds, production and HP requirements are being increased and greater attention is being given to reduction of wear and maintenance. Many of the latest designed units are being driven through universal spindles so that all the gears are mounted in rugged gear cases and, therefore, are not affected by bending action and heat in the working members.

The importance of gauge control for calendering was also stressed with the showing of the Crossed Axis Z Type Calender and various designs of special calenders having rolls up to 48 inches in diameter to overcome roll deflection. Screw type machines, for the continuous handling of certain types of plastics, are also being developed in the larger sizes. These as yet do not have universal use but are well adapted for particular products, Mr. Chase said.

Another trend is toward the elimination of mills, in conjunction with Banbury Mixers. Several types of extruders, strainers and pelletizers have been developed to handle batches discharged from the Banbury Mixer, resulting in labor savings, greater cleanliness and more uniform products, the speaker noted.

Dr. Thiessen's informative address on the sources of raw materials for plastics and elastomers was also accompanied by slides. H. I. Cramer, chairman of the Rubber Division, and J. C. Walton, superintendent of the Boston Woven Hose & Rubber Co., Cambridge, Mass., both spoke about the plans for the Spring Meeting of the Rubber Division to be held in Boston on May 23, 24 and 25.

International Meeting on May 6

The annual joint meeting of the Buffalo and Ontario Rubber Groups, which has become known as the International Meeting, will be held this year on May 6 at the Hotel General Brock in Niagara Falls, Ontario, Canada. The principal speaker will be Dr. R. P. Dinsmore, vice-president in charge of research of the Goodyear Tire & Rubber Co. The annual outing of the Buffalo group will be held on July 30 at the Lancaster Country Club in Buffalo, N. Y.

TECHNICAL TALKS FEATURE NEW YORK GROUP MEETING

The presentation of two technical papers featured the spring meeting of the New York Rubber Group, held on March 25 at the Henry Hudson Hotel in New York City. Approximately 300 members and guests were in attendance. The titles of the papers were "Silicone Rubber," by George S. Irby, Jr., of the Chemicals Division, General Electric Co., Pittsfield, Mass., and "Conductive Rubber," by Sherman R. Doner, technical representative of the Manhattan Rubber Division, Raybestos-Manhattan, Inc., Passaic, N. J. Pete Murawski, of the DuPont Rubber Chemicals Division, chairman of the group, presided at the meeting.

In opening his address on "Silicone Rubber," Mr. Irby, the first speaker, explained how this synthetic first emerged from the development stage during the latter part of World War II and briefly reviewed the chemistry of the material with the aid of several slides, comparing its structure with that of the natural rubber polymer. He also outlined preparation of silicone gum by both the direct reaction and Grignard methods.

Mr. Irby then explained that methyl silicone gum is available to industry in two principal types, one a brown gum of fairly firm consistency and the other a very soft gum, almost water white. The brown gum, when compounded with fillers, especially silica fillers, produces compounds which are very firm and which are excellent for extrusion purposes, while the water white type produces compounds which are very wet and plastic, having better flow characteristics and being superior for molding. Typical formulations of both gums together with their physical properties were discussed.

According to the speaker, the best vulcanizing agent for silicone rubber at present is benzoyl peroxide, its effectiveness stemming from a free radical mechanism of vulcanization. Other organic peroxides can be used to some extent, but are generally less effective than benzoyl peroxide. Sulfur does not cure silicone rubber. Mr. Irby explained that the amount of benzoyl peroxide which can be used is fairly critical and said that two parts per 100 parts of gum is generally used. He described the curing of silicone rubber as a gradual baking process during which the properties of the rubber change gradually.

The concluding portion of Mr. Irby's address was devoted to a discussion of the characteristics and properties of silicone rubber, including surface hardness, electrical properties, chemical properties and supercharger properties. Data was presented indicating how the surface hardness of silicone rubber remains constant over a change of from 60 to 200° C. as compared to two other synthetic rubbers. In these tests, the samples were raised from —60° C. to 200° C., holding at each 20° interval for a period of 10 minutes.

Talk on Conductive Rubber

Mr. Doner, the second speaker, discussed "Conductive Rubber." He first explained that it was the introduction of carbon black made by the burning of acetylene gas which first made possible the compounding of rubber to make it a conductor of electricity and stated that it is believed that the ability of a rubber-carbon black compound to conduct electricity is dependent on a continuous carbon-to-carbon particle contact throughout the mass. Since only some carbon blacks exhibit this ability, it is presumed to be dependent on the particle shape of the carbon black.

Although all types of natural and synthetic rubbers can be made conductive, Mr. Doner stated that the physical characteristics, such as hardness and elongation, are somewhat limited by virtue of the fact that relatively high loadings of conductive black are necessary. The tensile strength values generally approach those of a comparable loading of HMF black.

The speaker then discussed the principal applications of conductive rubber, including its use in the dissipation of static charges from vehicles, machinery, etc., and as a heating element. V-belts and flat transmission belting made from conductive rubber when used on properly grounded equipment will greatly reduce the accumulation of a static charge, usually reducing it to the point where ignition of fumes or danger of a dust explosion is practically eliminated.

Mr. Doner also outlined the work accomplished to date by the SAE-ASTM Technical Committee on Automotive Rubber to develop a standard method of test for the conductivity of rubber. Although one method has been adopted (ASTM D 991-48T), the committee is continuing its work to determine the reproducibility of the test and to determine, if possible, what conductivity limits can be used for specification purposes. Some of the various procedures now in use were discussed.

It was announced at the meeting that the summer outing will be held on Thursday, June 16, at Doerr's Grove near Millburn, N. J. Special entertainment was enjoyed at the meeting after dinner.

Improved Riding Quality

Three lines of completely new-styled passenger cars to be produced in eleven body styles, two wheelbases, and powered with a higher 7 to 1 compression engine have been announced for 1949 by the Dodge Division of the Chrysler Corporation. Freedom from harsh road shocks and improved riding comfort when driving under extremely severe road conditions are said to be obtained by a change in the design of the rubber limit bumpers at the rear axle to provide gentler engagement. Assisting in this function are two new intermediate rubber bumpers mounted on the frame midway between the rear axle and spring pivot which engage the springs slightly before the engagement with the main rear axle bumpers.

DIP PROCESS OF RECLAIMING TOPIC AT ONTARIO MEETING

A talk on a new reclaiming process, generally called the "Dip Process," by John G. Augenstein, chief chemist of the U. S. Rubber Reclaiming Co., Buffalo, N. Y., featured the meeting of the Ontario Rubber Section of the Chemical Institute of Canada held on March 8 at the University of Toronto in Toronto, Canada.

According to Mr. Augenstein, the new reclaiming process, developed by U. S. Rubber Reclaiming under the direction of Edward Sverdrup, was made possible by the development of suitable equipment which takes advantage of the discovery that vulcanized rubber scrap has a very sharp dip in Williams Plasticity values when heated for only a few minutes, then cooled under specified conditions.

The speaker stated that the Dip Process has many advantages over conventional methods. Being continuous, it is easier to control, requires less labor and less power, and the properties of the reclaims are practically independent of customary refining. Blends of the variety of elastomers can also be processed more uniformly.

Reclaims made by the new process, Mr. Augenstein said, are rather distinctly different from conventionally processed reclaims from similar scraps. They feel softer despite plasticity values of the same magnitude. They are generally lower in gravity, completely free from metal, and band on the mixing rolls quickly, thus requiring less mixing time. They also give superior abrasion resistance and have excellent load capacity, he added.

In concluding his talk, Mr. Augenstein pointed out that most dip reclaims require additional acceleration and reenforcing load to reproduce the moduli and cure rate of conventionally processed reclaims. Notable exceptions, he said, are tube reclaims which cure even slightly faster than conventionally processed stocks.

Coffee-Captan Aromatic

Cargille Scientific, Inc., 118 Liberty St., New York 6, N. Y., has introduced Coffee-Captan, a furfuryl mercaptan, one of the essential constituents of the aroma of roasted coffee. This new and powerful heterocyclic aromatic offers possibilities for use as a polymerizing agent or as a rubber vulcanization accelerator intermediate. Coffee-Captan is water-white and has a specific gravity of 1.132 at 20° C. The boiling point of the product is 55 to 57° C. at 17 mm and it is completely miscible with most organic liquids.

A.S.M.E. Meets May 2 to 4

The Spring Meeting of the American Sociey of Mechanical Engineers will be held at the Mohican Hotel in New London, Conn., from May 2 to 4. Technical sessions will be held by various divisions, including those devoted to power, management, applied mechanics, machine design and process industries. The Rubber & Plastics Division will not hold any sessions at this meeting.

RUBBER PRODUCTION PROBLEMS FEATURED AT CHICAGO CONFERENCE

Production problems involved in the manufacture of synthetic rubber, mechanical goods and tires were discussed in three separate addresses at the session on "Trends in the Production and Use of Synthetic Rubber" held on March 15 at the Hotel Stevens in Chicago, Ill., as part of the 1949 Chicago Technical Conference. The rubber session, sponsored by the Chicago Rubber Group, was conducted under the chairmanship of James T. Sheridan (N. J. Zinc).

In an address devoted to "Production of Synthetic Rubbers," Dr. R. V. Yohe, president, American Anode Co., Akron, related some of the problems encountered in the early days of the synthetic rubber industry. He pointed out that when the wartime synthetic rubber program was first launched, no large synthetic plant had ever been made before anywhere. A huge industry was born from scratch, and the job was done to the credit of all concerned, he said.

"Actually those of us who were concerned with synthetic rubber during the wartime period were midwives at the birth of a new industry, and our early skills were about comparable with those that midwives usually have," he said.

Considerable progress has been made since those early days, however, and those presently concerned with the manufacture of synthetic rubber may now be called experts. The day is not too far away when American-made rubbers will be manufactured to as closely controlled specifications as are most important chemicals."

In his address, the American Anode executive praised the contributions made in the synthetic rubber program by Dr. W. L. Semon, Walter Piggott, then acting chairman of the engineering committee charged with plant design, and Dr. E. R. Weidlein, head of the Mellon Institute.

Dr. Yohe expressed the hope that the war-born pooling arrangement for new developments will be discontinued within a few months. This arrangement inhibits full effort in the development of new and better synthetic rubbers, for no research group or any rubber company is very happy about disclosing all of its research successes to other members in the pool, he said. At the present time, the pooling arrangement is "probably a detriment" to this country, he added.

Talk on Mechanical Goods

P. F. Niessen, assistant works manager, Victor Manufacturing & Gasket Co., Chicago, talked on the "Production Problems Involved in Mechanical Rubber Goods and Gaskets." After a brief outline of the mechanical goods industry, Mr. Nieeson discussed some of the factors which are preventing both the consumer and the equipment manufacturer from obtaining the most value from rubber parts.

He cited three factors: These were: (1) Many rubber items are purchased to specifications with dimensional tolerances which are applicable to machined metal parts; (2) The unwillingness of some customers to test or investigate new or different compounds or constructions, and (3) Insufficient information as to end use and physical properties desired.

Concerning point one, design and product engineers, due to their lack of knowledge of what can be done by the rubber compounder and construction man, often specify conditions which are not practical, he said. As an example, he cited the gasket industry. Here companies work to dimensional and finish specifications which are "almost ridiculous," and probably unnecessary, he said.

"There is considerable test or laboratory evidence available that such rigid dimensional requirements are not necessary," he said. "Many people seem to forget that we are working with elastic materials and that their greatest characteristics or property is to be able to be deformed and recover almost at will."

Concerning his second point, he said the best example of difficulty in changing a specification laid down by a customer is in dealing with the Armed Forces. But civilian customers, too, take almost the same attitude.

Mr. Niessen listed these points as contributing to this attitude: (a) Satisfactory performance of present product, (b) Present cost of product is satisfactory, (c) Customer's cost in conducting tests, (d) Reluctance by manufacturer to disturb a satisfied customer and thereby his decision to not sell the client on the potentialities of making a change. However, progress can only be made by trying something new, Mr. Niessen said.

Concerning point three, entirely too many inquiries or requests for quotations are received by rubber companies which do not give the compounder or construction man information which he should have in order to recommend the compound, design, finish and dimensional tolerance for the part in question. If more information were provided, the mechanical goods rubber manufacturer could suggest a product which would not only give better performance but could possibly be less expensive.

In conclusion, Mr. Niessen said opportunities for new progress exist with the present and new elastomers constantly being developed, and their possible "marriage" with plastics and thermosetting resins.

Problems of the Tire Field

C. E. Mills, factory manager, Corduroy Rubber Co., Grand Rapids, Mich., discussed "Production Problems Involved in the Manufacture of Tires" in his address. This topic was covered from three different standpoints: sales and competition in today's market; costs and efficiency in tire production; and peculiarities in the manufacture of tires which often lead to production problems.

One real problem is brought about by the ability of the tire industry to supply a substantially larger number of tires than the market will consume, Mr. Mills said. He pointed out that today the tire industry has a capacity of 100,000,000 tires per year, but statistics indicate only 80,000,000 casings will be required annually under present conditions. This means that plants will be working at less than capacity. Operating any production set-up in that fashion means a proportionate loss in overhead carrying power, he said.

Efficiency in operation becomes a serious problem when it is necessary to curtail production below capacity levels, because of the high fixed overhead expenses which are common to the tire manufacturing plant. The speaker pointed out that, whereas the average capital investment for each worker in the United States is $4,051 (1946 statistics), in tire plants the figure is $10,000 per man. He cited the purchase prices of some of the major equipment used in tire manufacturing to justify these figures.

Because of the equipment costs, the first tire manufactured in a new plant of an expected 1,000 per day capacity would cost approximately $2,000,010.12. The $10.12 is an estimated material, labor, and overhead combined cost, he said.

Some Common Defects

Mr. Mills explained the steps contained in the manufacture of a tire at the Grand Rapids plant. Then he outlined common defects encountered in finished tires. Some of these defects were:

1. A wide or pinched bead, which usually results in a scrap tire. Such a defect may result from fabric cut at too high an angle, fabric cut either too wide or too long, the width of the drum having been improperly set, or improper centering of the air bag.

2. A narrow bead or pulled ply tire which makes an equally unsatisfactory product. Such a defect may result from fabric being cut at too low an angle, fabric plies being cut either too short or too narrow, the building drum having been set too narrow, or improper centering of the curing bag.

3. Under-cured tires due to some failure of either the internal or external curing system.

4. Improperly filled tread or sidewall design, usually the result of failure to bleed out air trapped between the tire surface and the mold.

5. Blisters between the plies in the tire or between the tire carcass body and the tread. These usually result from some foreign substance deposit or from moisture having been trapped within the tire.

Following the three addresses, a short question and answer forum was conducted on the various subjects.

Philadelphia Hears Scholz

The Spring Meeting of the Philadelphia Rubber Group was held on March 11, at Kugler's Restaurant in Philadelphia, Penna. Dr. Karl Scholz, Professor of Economics at the University of Pennsylvania, spoke on the subject "A Look Behind the Iron Curtain." Dr. Scholz made several visits to the U.S.S.R. prior to World War II, and spent most of last summer in Czechoslovakia, where he had an opportunity to study the effects of communism and the Russian influence on that country's economy.

STATUS OF EUROPEAN INDUSTRY TOPIC OF WASHINGTON TALK

Approximately 60 members and guests attended the ninth regular meeting of the Washington Rubber Group, held on March 22 in Washington, D. C. Dr. William F. Tuley, product manager, Naugatuck Chemical Division, U. S. Rubber Co., was the principal speaker. The meeting was presided over by T. A. Werkenthin (Bureau of Ships), chairman of the group, and Dr. Tuley was introduced by D. K. Bonn, associated with U. S. Rubber's Washington office.

Under the title, "What Does Europe Have to Recover," Dr. Tuley discussed the current status of the European rubber manufacturing industry. According to Dr. Tuley, who spent some six weeks in Europe during November and December of last year, present conditions and future prospects of both the European rubber and chemical manufacturing industries are excellent. Rubber consumption in 1948 by Western European countries, excepting Germany, was 10 to 100% above the prewar figures. In Germany, consumption was about 50% of the 1939-40 annual average.

Rubber manufacturers in Europe are, like most European industries, handicapped by shortages of raw materials particularly those which must be imported and paid for in hard currencies. Essential imported materials, such as carbon black, are given first priority and textile products, pigments, and chemicals are mostly obtained from European sources although at a higher cost in most cases.

Many European rubber factories, particularly those constructed or modernized before or since the last war, are well equipped and efficient. War damage has been repaired and production capacity is greater than before the war. The larger establishments have excellent technical facilities. Both the large and many small establishments have well-qualified technical personnel with a great interest in all advances in rubber technology.

The European rubber industry has made an excellent recovery of its production capacity and is fast reaching a position to supply all domestic needs and have a surplus for the world export market, the speaker concluded.

Chicago Plans Talks on Resins

The meeting of the Chicago Rubber Group to be held on May 20 at the Morrison Hotel, Chicago, Ill., will feature two papers on resins. J. C. Searer of the Durez Plastics and Chemical Co. will speak on "Phenolic Resins in the Rubber Industry." M. E. Jones of the Marbon Corp. will address the group on "A New High Styrene Reinforcing Resin—Marbon 8000." At the conclusion of the technical session an election of officers for the 1950 season will be held.

An Index to Volume 64 of RUBBER AGE will be found on Pages 113 to 116 of this issue.

Named Executive Vice-President

P. J. Lathrop

The Cameron Machine Co., 61 Popla St., Brooklyn, N. Y., has announced the election of Palmer Jadwin Lathrop as executive vice-president. Mr. Lathrop has been associated with the Cameron company since September, 1948. He was formerly vice-president in charge of production for the Bristol-Myers Co. During the war he served with the U.S.A.A.F. in the Alaskan Division of the Air Transport Command. Mr. Lathrop was graduated from Princeton University in 1931.

HERZEGH ADDRESSES DETROIT ON PUNCTURE SEALING TUBELESS TIRE

The March 11 meeting of the Detroit Rubber and Plastics group held at the Detroit-Leland Hotel, Detroit, Mich., was addressed by Frank Herzegh, tire development engineer for the B. F. Goodrich Co. Mr. Herzegh spoke on the "Puncture Sealing Tubeless Tire." The speaker noted that the development of a tubeless tire that would operate satisfactorily on passenger car service has been a goal of inventors since the inception of the pneumatic tire.

Mr. Herzegh traced the development of the tubeless tire and recounted early difficulties encountered. Such matters as tire cords, weights, sealing compounds and air locks were discussed. In the latest models of the puncture sealing tubeless tire, many of these problems have been solved or circumvented through research.

Summarizing the advantages of the puncture sealing tubeless tire, Mr. Herzegh noted the structure of this tire which provides a thin, effective barrier against diffusion of air into the tire body. High strength rayon cord bodies combine bruise resistance with thin crown gauge for cool operation, he said, resulting in greatly reduced blowout hazards inherent with integral body liner construction. Only a slight bead shape modification is necessary in order to provide a simple means of sealing the tire on a standard drop center rim. Another advantage is the addition of a layer of a puncture sealing material in the crown area.

SEARER ADDRESSES BUFFALO ON PHENOLIC RESINS IN RUBBER

The Buffalo Rubber Group meeting of March 22, held at the Hotel Westbrook, Buffalo, N. Y., was addressed by J. C. Searer, director of research and development for the Industrial Resins Division of Durez Plastics and Chemicals, Inc., North Tonawanda, N. Y. The subject of Mr. Searer's address was "Phenolic Resins in the Rubber Industry."

The speaker said that Durez phenolic resins are being used in increasing amounts for modifying rubber. The main uses are in rubber compounding, rubber cements, and with various rubber latices. Rubber is also being used to modify phenolic molding compounds. In rubber compounding the phenolic resins act as thermosetting plasticizers, allowing easier processing stocks to be formulated, which on curing show improved tensile strength, higher hardness, stiffness, solvent, oil and abrasion resistance.

Solvent type rubber adhesives containing phenolic resins are finding a wide variety of uses including bonding of brake linings to brake shoes, shoe soles to uppers, and linoleum to wood. Mr. Searer stated that improvements resulting from modification with phenolics include higher heat resistance, increased toughness and better adhesion. Phenolic resins have been formulatd for use with various rubber latices and are finding use in laminating, paper treatment, manufacture of gaskets and other fields.

Marketing "Specification" Rubber

Plastorub, a modified natural rubber which is chemically plasticized in its latex form before it is sheeted and dried on the plantation, has been introduced to the American market by the Socfin Company, Ltd., of Malaya. The first of a planned number of "special purpose natural rubbers," Plastorub is said to be uniform in certain important chemical and physical properties and may enable manufacturers to short-cut processes and streamline production. Power consumption is said to be lower and less heavy equipment is required. Plastorub is distributed in the United States by Latex Distributors, Inc., 80 Broad St., New York 4, N. Y.

Hycar OR-15 in Powder Form

The commercial production of Hycar OR-15 nitrile rubber in powder form has been announced by the B. F. Goodrich Chemical Co., Cleveland, Ohio. Designed especially for mill and Banbury blending with phenolic resins, the development of Hycar powder now makes economically feasible the manufacture of rubber-phenolic molding compounds with exceptionally high impact resistance, the company said. The use of Hycar OR-15 powder has been indicated in the blending of petroleum and vegetable resins as shellac replacements. The product was previously supplied in two basic forms, dry sheet rubber and latex.

NATURAL LATEX PRODUCERS FORM TECHNICAL COMMITTEE

Representatives of the producers of natural rubber latex or their American agents met recently and formed a permanent organization known as the Technical Committee of Natural Latex Producers. The committee was formed to consider any technical matters of interest to the industry, and to assist in maintaining and improving the quality of natural latex. Membership consists of representatives of the following organizations:

General Latex and Chemical Corp., Goodyear Tire & Rubber Corp., Firestone Tire & Rubber Co. and its subsidiary, Xylos Rubber Co., H. A. Astlett & Co., Dunlop Rubber Co. represented by its agents, Charles T. Wilson & Co., Inc., Revertex Corp. of America, Latex Distributors, Inc., U. S. Rubber Co. and its Naugatuck Chemical Division.

E. M. McColm of the Plantation Division of U. S. Rubber, was elected chairman of the organization, and W. T. L. Ten Broeck of the Goodyear Tire & Rubber Co., vice-chairman. The committee will meet from time to time to consider any technical matters which may require industry-wide collaboration.

Emphasis will be placed on defining standards of quality and maintaining them at the highest level which can be met with present known production methods. The committee said that such collaborative effort will result in the establishment and general usefulness of the commodity in contrast to the artificial standards based on appearance, rather than technical quality, now in vogue in the dry rubber market.

Weld Addresses Gates Club

Approximately 90 members and guests attended the March 2 meeting of the Gates Technical Club held at the Edelweiss Restaurant, in Denver, Colo. Principal speaker of the evening was John Weld, public relations manager for the Western Region of the Ford Motor Co. Mr. Weld spoke on the subject "What to Expect in the Automobile of Tomorrow." The speaker discussed trends towards over-all dimensions of future automobiles and the relationship of motors and front axle towards riding comfort. Mr. Weld maintained that the public does not want a small automobile, but rather a large car for a small price.

Baillieu Heads Dunlop Co.

Australia-born Sir Clive Baillieu has been appointed chairman of the Dunlop Rubber Co., Ltd., London, England. Sir Clive, formerly deputy chairman, succeeded Sir George Beharrell, who resigned on March 31 after 26 years with the company and nearly 12 years as chairman. Sir George has been appointed president of the company, and although he has relinquished all executive duties, he will be available in an advisory capacity.

Tire Cost Deduction

It costs the average motorist more for gasoline taxes each year than it does for tires and tubes, according to the latest study on operating costs completed by D. E. Carson, director of business research of the B. F. Goodrich Co. The average motorist will drive 10,000 miles this year, wearing out 1.6 tires and tubes which will cost him approximately $30.16. The owner of a popular make car will use an estimated 667 gallons of gasoline in 1949, which means that in such states as New York and Ohio he will pay $36.69 in taxes on motor fuel. To summarize, it will cost the average motorist approximately 22% more in gasoline taxes than the cost of his tires and tubes.

NEWMAN OF B. F. GOODRICH STILL SEES BIG TIRE YEAR

The B. F. Goodrich Co. sees no reason why it should change its earlier 1949 total tire sales estimates, according to a statement made by James J. Newman, vice-president in charge of sales for the company, in New York early this month. The initial Goodrich estimate predicted sales of 85,000,000 units, or some 2,000,000 more than last year.

Reflecting the company's confidence in demand, Mr. Newman revealed that two new plants will shortly go into production on tubeless tires at Tuscaloosa, Alabama, and Miami, Oklahoma. Eventually, he said, tubeless tires may also be made at the Oaks, Penna., plant. Goodrich has introduced tubeless tires in various sections of the country and plans to merchandise them in the New York area before the end of the year.

Mr. Newman emphasized that the factor which has the most bearing on the number of tires sold throughout the country, is the total number of two-year old or older automobiles in use. This year, more than 30,800,000 such cars and trucks will be in use, an increase of between 800,000 and 900,000 over the 29,900,000 in use last year. Each of these cars represents a customer for several new tires.

The trend throughout the whole country, for manufacturers and distributors, dealers and consumers is to become "inventory conscious." At the last year-end, tire wholesalers had lower inventories than they held over from the previous year-end. Even now, dealer inventories throughout the country are sub-normal, Mr. Newman declared. By contrast, demand for tubeless tires, for example, is so great that the company has a considerable backlog of orders.

An Index to Volume 64 of RUBBER AGE will be found on Pages 113 to 116 of this issue.

CURBS ON NATURAL RUBBER EASED FOR TUBE MANUFACTURE

Inner tube manufacturers may now use more natural rubber in the production of popular-size tubes as the result of an amendment of Rubber Allocation Order R-1, issued on March 16 by the Department of Commerce.

Effective immediately, the change in the Department order permits a manufacturer to make 40 percent of his 9.00 cross-section and smaller tubes of natural rubber. The remaining 60 percent must be manufactured from butyl. Previously, 80 percent of a producer's output of popular-size passenger car and small bus and truck tubes had to be made of butyl.

The Office of Domestic Commerce said that while the change permits reduction of butyl use from approximately 60,000 to 40,000 long tons a year, the Department does not expect consumption of the synthetic to decrease materially. Officials explained that acceptance of butyl by manufacturers and the public promises its continued wide use on a voluntary basis. It is not anticipated that the new tubes specifications will interfere with accumulation of natural rubber for the strategic stockpile, they said.

The amendment of the rubber order also eliminates the certification which importers of rubber products not under specification controls in this country were required to file with Collectors of Customs. Importation of products under specification controls remains prohibited, however, and requests to bring them into this country will continue to be handled as appeals by the ODC Rubber Division.

Geon Paste Resin 121

B. F. Goodrich Chemical Co., Cleveland 15, Ohio, has announced the large scale production and a substantial reduction in the price of its Geon Paste Resin 121, formerly called 100 x 210 N. Carload lots are now available at 37 cents per pound, as compared with the previous price of 40 cents. Used in both plastisol and organosol formulations, Geon Resin 121 is especially adaptable to the former process. The product has smaller particle size, higher molecular weight, greater uniformity and yields plastisols of lower viscosity, according to the company. In addition to conventional textiles, fibreglass and paper are successfully coated with Geon Resin 121 formulations. Geon Resin 121 is said to allow greater simplicity of equipment design and lower cost for dip-coated articles such as gloves, dish racks and plating racks. The same is true for molding toys or dolls, artificial fish lures and prosthetic devices by slush or low pressure techniques.

Compiling 1949 Scrap Manual

The 1949 edition of the Waste Trades Manual and Directory, published by the British-Continental Trade Press, Ltd., 225 West 34th St., New York 1, N. Y., is now under compilation. The manual includes listings on a world-wide basis. Companies interested in having information included in the Scrap Rubber Section are asked to contact the publishers for a free listing.

PROGRAM IS ARRANGED FOR GORDON RESEARCH CONFERENCES

The Gordon Research Conferences for 1949, sponsored by the American Association for the Advancement of Science, formerly known as the Gibson Island Research Conferences, will be held from June 20 to September 2 at Colby Junior College in New London, N. H. The facilities of the college have been made available for the conferences.

As usual, the conferences will cover a variety of subjects including polymers, petroleum, catalysis, ion exchange, textiles, corrosion, instrumentation, food and nutrition, and medicinal chemistry. The sessions on polymers will be held from July 11 to 15 and will feature the presentation of thirteen papers, as follows:

Polymerization and Polymer Properties in the Solid State, by H. F. Mark.

Molecular Configuration and Intrinsic Viscosity of Polymers, by P. J. Flory.

Light Scattering and the Structure of Polymers, by B. H. Zimm.

Rheological Properties of Polymers, by R. S. Spencer.

Absolute Rate Constants in Free Radical Polymerizations, by M. S. Matheson.

Long-Lived Free Radicals in Polymerization Reactions, by K. Nozaki.

Redox Emulsion Polymerization Systems, by G. E. Hulse.

Physical Characterization of Cellulose Xanthate in Solution, by J. M. Swanson.

Copolymerization by Non-Radical Mechanisms, by C. T. Walling and F. R. Mayo.

Friedel-Crafts Catalyzed Polymerization at Low Temperatures, by R. G. Heiligmann.

Some Reactions of Alkyl Percarbonates, by S. G. Cohen.

Some Molecular Interactions with Polar Polymers, by C. D. West.

Experiments on Diffusion of High Polymers, by C. A. Winkler.

Requests for attendance at the conferences, or for any additional information, should be addressed to W. George Parks, Director, Department of Chemistry, Rhode Island State College, Kingston, R. I.

Building Textile Laboratory

U. S. Rubber Co. will build a $250,000 laboratory for textile research and development at Winnsboro, S. C., which will permit the consolidation of the research and development work carried on in Winnsboro, in Hogansville, Ga., and elsewhere, and will provide for substantial expansion of these activities. The new building will adjoin the company's textile mill in Winnsboro, which is the largest of nine mills operated by the textile diviison of the company. Construction of the new facilities at Winnsboro will start as soon as building plans are completed. It is expected that the new laboratory will be in operation in about nine months. S. H. Sherman, manager of the Development Department of the Textile Division, will move his headquarters from Hogansville to Winnsboro and will be in direct charge of the laboratory under the general supervision of R. C. Harrington, technical director of the Textile Division.

BIOGRAPHIES OF CURRENT OFFICERS OF NEW YORK RUBBER GROUP

Pete Murawski

D. Earl Jones

Officers for 1949 of the New York Rubber Group include Pete Murawski as chairman, D. E. Jones as vice-chairman, Emil W. Schwartz as sergeant-at-arms, and B. B. Wilson as secretary. Biographies of the chairman and vice-chairman follow herewith.

Pete Murawski, the present chairman, was born in Brooklyn, N. Y., on June 28, 1899. He attended the Brooklyn Polytechnic Institute in Brooklyn and St. Benedict's College at Atchison, Kansas. Entering the business field in 1917, Mr. Murawski spent two years with the William Becker Aniline and Chemical Co. and in 1919 joined the Grasselli Dyestuff Corporation, working in the New York office. From 1926 to 1928 he was associated with the Standard Oil Co. of New York.

In late 1928 Mr. Murawski joined the sales staff of the Grasselli Chemical Co. in Cleveland, reporting to Dr. Ira Williams, now research director of J. M. Huber, Inc. When the DuPont organization took over Grasselli in 1929, Mr. Murawki joined the DuPont Rubber Chemicals Division as a technical sales representative and has continued in that post since, specializing in the sale of neoprene and rubber chemicals to the wire field for the past ten years. Mr. Murawski is a member of the American Chemical Society and its Rubber Division as well as a member of various local rubber groups. He is married, has three children, and pursues farming as a hobby.

D. Earl Jones, the present vice-chairman, was born in Utica, N. Y., on November 25, 1896. After attending elementary school in Utica and high school in Glens Falls, N. Y., he went to Colgate, being graduated with a B.S. in 1917. After serving in the Army Ordnance Department during World War I, he entered the employ of the American Hard Rubber Co. as a chemist in 1919. He was named chief chemist of the company in 1927 and in 1927 was appointed manager of chemical research, the position he currently holds.

Mr. Jones is a member of the American Chemical Society and its Rubber Division. He is also a member of the Electrochemical Society and company representative for American Hard Rubber on Committee D-11 of the American Society for Testing Materials. During the last war he was chairman of the Hard Rubber Consulting Technical Committee of the OMD Rubber Bureau. Mr. Jones is also active in civic affairs in Butler, N. J., being a member of the Boards of Health and Education. He has been president of the latter board since 1943. He is married and has one daughter.

Ferro Chemical Stabilizers

Ferro Chemical Corp., Bedford, Ohio, has developed a new and complete line of heat and light stabilizers for polyvinyl chloride and associated copolymers. These stabilizers have been designed for ease of handling and incorporation in plastics processing. They are said to impart excellent clarity and stability to clear stocks. The stabilizers are equally effective in pigmented stocks and exhibit little or no reaction with pigments.

Thermoid Stock Bonus Plan

Thermoid Co., Trenton, N. J., has registered approximately 60,000 shares of common stock with the Security Exchange Commission to be issued under a contributory savings and stock bonus plan. Membership in the plan will be made available to about 1,400 company employees. The company is expected to contribute about $80,000 to the 1949 trust, while the employee contributions will amount to about $400,000.

NEWS IN BRIEF

A new booklet, entitled "Four Ways of Doing an Export Business," comprising a series of "know-how" articles of interest to exporters, is available from the publisher, *Exporters' Digest*, 170 Broadway, New York 7, N. Y.

Monsanto Chemical Co., in an effort to simplify the trade names used in the plastics industry, has redesignated all of its polystyrene products with the name "Lustrex."

A distributor of safety appliances in the Southeastern section of the country is using Koroseal brattice cloth in the manufacture of stretchers used in carrying disabled workmen from mines.

"Indonex Plasticizers in Neoprene Compounds," is the title of the latest technical report to be issued by the Indoil Chemical Co.

U. S. Rubber has published a 100-page manual containing a comprehensive set of drive tables for multiple belts, complete sheave data including construction, dimensions, and weights, complete fractional horsepower drive layouts, and other useful material for engineers in designing multiple and light duty V-belt drives.

Manhattan Rubber recently received for the third time in as many years a certificate from the National Garden Institute for its contribution to the National Garden Program.

Glyco Products has announced that it is now producing glyceryl mono-oleates by a new process which makes possible the production of lighter colored and more highly surface-active materials at lower cost.

A bulletin highlighting the cause and cure of industrial dermatitis is currently available from L. E. Hicks & Son, Inc., Oak Park, Ill. The booklet summarizes the cost to industry of dermatitis, its prevalence in various industries, and methods of preventing it.

Dow Corning Corp., Midland, Mich., has made available a revised edition of its booklet on DC Antifoam A, the silicone compound for killing foam in aqueous systems. Copies are available on request to the company.

The Carboline Co., St. Louis 5, Mo., has announced a new thermosetting resin named "Carbo-Fix," which is used as a corrosion-resisting repair cement.

"It's the Principle of the Thing" is the title of a new booklet distributed by U. S. Rubber which tells motorists how they can get up to 78% more mileage from their tires.

A technical bulletin on "Carbon Black Reinforcement of 41° F. Low Temperature Rubber" has been made available by the Rubber Chemicals Division, Phillips Petroleum Co., Akron, Ohio. Copies are available on request to the company.

William Whitman Co., Inc., one of the larger textile manufacturers in the New England area, has organized Whitman Plastics, Inc., with a plant at Lynn, Mass., for the manufacture of vinyl film.

Union Pacific Railroad, Omaha, Nebraska, has issued a supplement to its booklet on "Memorandum of Increased Rates and Charges." Several additional changes in rates are noted in the supplement.

Binny & Smith Co. has made available special reprints of the article on "Carbon pH and Structure in Rubber Compounding," which was originally published in the October, 1948, issue of *India Rubber World*. Copies are available on request to the company.

A new series of six sound slide films, entitled "Human Factors in Safety," has been released by the National Safety Council, Chicago. The films are intended to aid management's foreman training program. Details can be secured direct from the Council.

Carrier Corporation, Syracuse, N. Y., has released a new 16 mm sound motion picture in color dramatizing the functions and benefits of air conditioning in the home, in commerce, and in industry. A 22-minute film, it is entitled "Service Unseen."

Live, semi-tropical fish are now being transported in giant "fishbags" made by Goodyear. The "fishbags" consist of rubber-covered nylon tanks. These are mounted on trucks, loaded with about 400 fish, and air is constantly pumped into the tanks.

Goodyear has reported that its cyclized rubber resin, natural rubber Pliolite, has been returned to volume production. This type resin is still the preferred one for specialized applications, such as hot melt coatings.

Non-ionic surface active agents in general and glycol and polyglycol esters of fatty acids are described in a reprint now available from the Glyco Products Co., Brooklyn 2, N. Y.

Designed to protect lives and property, a new fire-retardant paint and coating named Flame-Seal, which is also non-toxic, has been developed by the Stallton Chemical Corp., Long Island City 1, N. Y.

Cambridge Televisionette Boot

The Cambridge Rubber Co., Cambridge, Mass., is featuring a new rubber boot especially designed to conform to the latest trends in new look styles in women's shoes. Named the Televisionette,

the boot is a companion product to the Television boot produced by the company. The new features of the Televisionette which distinguish it from the original Television model are a lower cut plus sleek contour lines for the ultimate in smart footwear appearance. The boot is waterproof right up to the top because of a special gusset under the zipper.

Glyco Products Co. has transferred all of its Brooklyn, N. Y., manufacturing and research facilities to its main plant at Natrium, W. Va.

Minneapolis-Honeywell Regulator Co. has acquired the assets of the H. Belfield Co., manufacturers of control valves. The new acquisition will be known as the Belfield Valve Division of Minneapolis-Honeywell.

"Required Equipment for Lubrication Control" is the title of a new publication illustrating the Portable Oil Inspection Kit produced by the Gerin Corp., Red Bank, N. J.

Use of rubber hydraulic control hose on the fuel injection systems of large Diesel powered trucks as a replacement for copper or flexible metallic tubing has been reported by Goodrich.

Gould Storage Battery Corp., Trenton, N. J., has published a 40-page pocket-size handbook of instructions and engineering data on the care of motive-power batteries.

A modern method of harvesting oysters utilizing suction hose produced by Goodrich in equipment which resembles a giant vacuum cleaner is being used by H. C. Rowe & Co., of New Haven, Conn.

J. M. Huber Corp., has completed the distribution of a $600,000 bonus among its employees, and deposited approximately $170,000 into its salaried employees' profit-sharing trust fund.

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BETTER TEAR

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STATEX K

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1 The scorch and processing handicaps of cold rubber have been overcome through the use of VFF carbon (Statex K).

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MANUFACTURER DISTRIBUTOR

NEW POLYMERS AUTHORIZED BY OFFICE OF RUBBER RESERVE, RECONSTRUCTION FINANCE CORPORATION

Listed below are types and properties of new experimental GR-S polymers (including GR-S latices) which have been authorized by the Office of Rubber Reserve, Reconstruction Finance Corporation, since publication of those in our previous issue. Procedures for the distribution and sale of these polymers will be found in our October, 1945, issue. Normally, experimental polymers will be produced only at the request of the consumers and 20 bales (one bale weighs approximately 75 pounds) of the original run will be set aside if possible for distribution to other interested companies for their evaluation. The 20 bales when available will be distributed in quantities of one or two bales upon request to the Sales Division of Rubber Reserve or will be held for six months after the experimental polymer was produced unless otherwise consigned before that time. Subsequent production runs will be made if sufficient requests are received to warrant them.

X Number	*Manufacturing Plant*	*Date of Authorization*	*Polymer Description*
X-512 GR-S-SP	U. S. Rubber, Naugatuck	3-14-49	GR-S made at reduced reaction temperature with cumene hydroperoxide activated recipe emulsified with potassium oleate. Shortstopped with ditertiary butyl hydroquinone. Mooney 55 ± 5; antioxidant 1.25% BLE. Polymer coagulated by dilute alum—dilute latex technique.
X-513 GR-S	Goodyear, Torrance	1-14-49	GR-S made at reduced reaction temperature with cumene hydroperoxide activated recipe emulsified with Dresinate #214. Shortstopped with dinitrochloro benzene. Mooney 55 ± 5; antioxidant 1.25% BLE.
X-514 GR-S	U. S. Rubber, Borger	1-24-49	Copolymer of butadiene and styrene; of the hydrocarbon present, approximately 15% is derived from styrene. Polymerized at reduced reaction temperature with cumene hydroperoxide activated recipe emulsified with Dresinate 731. Shortstopped with ditertiary butyl hydroquinone. Mooney 50 ± 5; antioxidant 1.25% BLE.
X-515 GR-S	Firestone, Lake Charles	1-28-49	Same as GR-S-45-AC except shortstopped with 0.05 parts hydroquinone. Mooney 42 ± 4.
X-516 GR-S	General, Baytown	3-4-49	A mixture of 50 ± 2 parts Statex K and 100 parts of GR-S type polymer having a Mooney of 45 ± 4 on the finished unpigmented polymer. Stabilized with 1.5% PBNA.
X-517 GR-S	General, Baytown	2-23-49	A mixture of 50 ± 2 parts Philblack O and 100 parts of GR-S type polymer made at reduced reaction temperature with cumene hydroperoxide activated recipe emulsified with Dresinate #214. Polymer shortstopped with dinitrochlorobenzene. Mooney of the unpigmented polymer 40 ± 5; stabilized with 1.5% PBNA on the contained polymer.
X-518 GR-S	Goodyear, Torrance	3-1-49	GR-S to be used as standard reference bale starting March 7, 1949.
X-519 GR-S	U. S. Rubber, Borger	3-14-49	GR-S made at reduced reaction temperature with cumene hydroperoxide activated recipe emulsified with potassium oleate. Shortstopped with dietertiary butyl hydroquinone. Mooney 70 ± 5; antioxidant 1.25% BLE.
X-520 GR-S	Goodyear, Torrance	3-4-49	GR-S made at reduced reaction temperature with cumene hydroperoxide activated recipe emulsified with Dresinate #214. Shortstopped with 0.15 parts dinitrochlorobenzene. Mooney 55 ± 5; antioxidant 1.25% BLE.
X-521 GR-S	Goodyear, Torrance	3-4-49	GR-S made at reduced reaction temperature with cumene hydroperoxide activated recipe emulsified with Dresinate #214, shortstopped with ditertiary butyl hydroquinone. Mooney 55 ± 5; stabilized with a non-staining type antioxidant R-2019G.
X-522 GR-S	Goodyear, Torrance	3-4-49	Same as X-521 GR-S except polymer is coagulated by diluting Latex to 4%—dilute alum technique.

NOTE: The above new polymers are experimental only and the Office of Rubber Reserve, Reconstruction Finance Corporation, does not make any representations or warranties of any kind, express or implied, as to the specifications or properties of such experimental polymers, or the results to be obtained from their use.

Glycerine Prices Reduced

Procter & Gamble Co., Cincinnati, Ohio, and Lever Brothers, Inc., Cambridge, Mass., have reduced their prices for all grades of glycerine 15 cents a pound, making their products competitive with synthetic glycerine which is currently quoted at approximately 24 cents a pound, f.o.b. Texas refineries. Lever Brothers' new price for chemically pure glycerine in tank car lots delivered in New York City was quoted at 24½ cents per pound. Lever officials said that these prices will probably be kept competitive with synthetic glycerine prices. The highest postwar prices for refined natural glycerine ranged about 55¾ cents, but at the opening of 1949 were around 40 cents, with price variations by fractions of a cent upward or downward depending upon grade.

Heads International Latex Corp.

W. O. Heinze, formerly vice-president of the International Latex Corp., Dover, Delaware, has been elected president of that company, succeeding A. N. Spanel, who has been made chairman of the board. Mr. Heinze joined the corporation as general manager in September, 1943, and has been in charge of all manufacturing operations. It was also announced that Frederick W. Andrews, who has been in charge of research and development, has been elected vice-president, and Irving Obrow has been named assistant treasurer.

An Index to Volume 64 of RUBBER AGE will be found on Pages 113 to 116 of this issue.

Producing "Cold Rubber" Latex

Production of cold rubber latex was started recently at the government plant operated by the U. S. Rubber Co. in Naugatuck, Conn. The plant will produce approximately 2,500 tons of cold rubber latex per year for use in large scale service trials in such products as saturated paper and fiber products, adhesives, foam rubber, gaskets, brake linings, tire cord dipping solution and wire insulation. Company officials explained that the 2,500 ton figure represents about 8% of the plant's total rated capacity. If cold rubber proves as successful in new uses as it has in tires, additional equipment will be installed to produce larger quantities of the material.

UNOFFICIAL HISTORY OF THE RUBBER DEVELOPMENT CORPORATION

A summarized history of the operations of the Rubber Development Corporation and its predecessor agency, the Rubber Reserve Company, in the procurement and development of natural rubber during the wartime years, has recently been made available. One of the authors, Douglas H. Allen, was actively associated with the natural rubber procurement program from its inception in March, 1942, until his resignation as president of the Rubber Development Corporation on October 1, 1944. The other author, Francis Adams Truslow, served as the special representative of the Rubber Reserve Company, and its successor, the Rubber Development Corporation, in Peru, from the inception of the program in that country until he became a vice-president of Rubber Development Corporation on October 1, 1944. He served in that capacity until his resignation in November, 1945.

Not An Official Document

It is to be noted that while the history is based upon official documents and upon the authors' intimate knowledge of the natural rubber program, it does not purport to be an official document. Rather, the authors undertook the preparation of this summary at the request of the Hon. Jesse Jones, formerly Federal Loan Administrator and Secretary of Commerce, who felt that a summarized history of natural rubber procurement should be available for refe nce in connection with the over-all history of the Reconstruction Finance Corporation.

The authors note in a foreword that since the Rubber Development Corporation has discontinued operations and has, in effect, been liquidated, it is doubtful that there is anyone at present in Government service sufficiently familiar with all the aspects of the natural rubber procurement program from its inception to be in a position to summarize the history of the program. A further reason for the preparation of this summary was to clarify the statements made in the United State Senate and in the press during the war which created the erroneous, but widespread, impression that wild rubber from Latin America, delivered under the inter-American rubber agreements, cost the United States Government around five dollars per pound, whereas the actual average cost was less than 60 cents per pound.

History Should Prove Useful

A review of the problems encountered in the procurement and development of natural rubber in World War II may be helpful in formulating a wise policy in the postwar period with respect to stockpiling, maintenance of synthetic rubber production and related problems, the authors believe. The history of natural rubber procurement, prior to the formation of the Rubber Development Corporation, is a classic example of the evils of divided responsibility and divided authority with respect to the procurement of a strategic commodity, while its history after the formation of the Corporation demonstrates the advantages of concentrating in a single entity full responsibility and full authority, maintain Messrs. Allen and Truslow.

The summary states that in its organization and method of operation, the Rubber Development Corporation represented a novel and significant departure from the organization and method of operation of most government corporations. Rubber Development Corporation was, in actual practice, an independent corporate entity not subject to the administrative control of any department or agency of Government. The board of directors of the corporation included representatives of every agency of Government having a recognized interest in natural rubber procurement. A decision of a majority of the directors was final, and an executive committee of the board had authority to take action on behalf of the committee on urgent matters.

In brief, say the authors, the experience of the corporation indicates that the corporate form is probably the most efficient way of accomplishing a "business" purpose in government, providing there is a careful definition of its purposes and its relationship to other agencies of government, as well as a limitation of its powers and functions.

Anent Foreign Negotiations

Despite the fact that the Rubber Development Corporation was continually involved in difficult and delicate negotiations with various governments of Latin America, there was full cooperation and little or no friction between the Department of State and the corporation. A representative of the Department of State served as a director of the corporation, thus creating a continuing and informed liaison with the Department of State and the Rubber Development Corporation.

The history of the natural rubber procurement program is of significance from the standpoint of international relationships, say the authors. It demonstrated that a complex and difficult production program, coupled with unpopular restrictions upon consumption, can be successfully achieved by a full, free, and equal partnership between the United States and the governments and the peoples of the Latin American countries concerned. There must, however, be a common objective, and a friendly, cooperative, but wholly realistic attitude on the part of the participants, and an appreciation of the sovereign rights of the countries involved.

Inter-American Agreements

Within a few weeks after Pearl Harbor, the United States was cut off from 90% of the available sources of natural rubber. Peacetime consumption of the United Nations was estimated at 900,000 tons and wartime unrestricted requirements at 1,200,000 tons per year. Through purchases by private industry and stockpiling activities of the Rubber Reserve Company, there had been built up by the end of 1941 in the United States an inventory of 533,344 long tons of natural rubber. By April, 1942, this inventory had increased to 630,000 tons.

The summary points out that the chief plantation sources left open to the United Nations were Ceylon, India and Liberia, with a combined production at that time of around 115,000 tons per year. The extent to which production in these areas could be increased was limited and could be forecast within a narrow margin. New heavy rubber plantations could not be established in time to supply war needs because five to seven years is required for rubber trees to grow to tappable size.

The gap between the available 115,000 tons from Ceylon, India and Liberia, and the estimated requirements of over 1,200,000 tons per year, could only be bridged by drastic rubber conservation, by maximum ultilization of reclaimed rubber, by the immediate development of a vast synthetic rubber industry in the United States, and by the maximum development of wild rubber in Africa and Latin America.

Under terms of an agreement with Great Britain, that country assumed responsibility for the procurement and development of maximum natural rubber supplies from Ceylon and India, and from Africa. The United States assumed a like responsibility with respect to the producing countries of the Western Hemisphere and Liberia.

To that end, the Department of State, in conjunction with the Rubber Reserve Company, undertook the negotiation of agreements with all the rubber producing countries of Latin America providing for the sale for a term of years, at a fixed price, to the United States of their exportable surpluses of crude rubber and rubber manufactured goods and the limitation of local consumption. In turn, the United States gave assurances to the producing countries that their essential requirements for rubber and rubber manufactured goods would be supplied insofar as the war needs of the United Nations permitted. During the period March, 1942, to October, 1942, agreements with all sixteen producing countries of Latin America were concluded.

Under these rubber agreements, primary responsibility for effectuating the purposes of the agreement and for bringing about maximum production was placed upon the government of the producing country. The function of the Rubber Reserve Company and of the Rubber Development Corporation, as its successor, other than purchasing the exportable surpluses of rubber and rubber manufactured goods, was to collaborate with and to aid the producing countries in effectuating the purposes of the agreements.

Problems of Development

The authors state that plantation rubber in Liberia presented no serious problem because the plantations were almost entirely owned and operated by the Firestone Tire & Rubber Co. The company gave assurance that every practicable step would be taken to bring about maximum production.

The principal actual or potential sources of supply of rubber in Latin America were the wild guayule shrub found mostly in Mexico, and wild tree rubber of the Hevea and Castilloa varieties found

throughout Mexico, Central America and Northern South America. Mangabeira and Manicoba trees in the semi-arid areas of North-Eastern and Central Brazil, presented, at once, the greatest possibility of expansion and the most complex and difficult problem.

The authors explain that in bringing about the production of wild rubber, the problem is primarily one of establishing a stable and profitable price and of supplying and equipping the individual rubber tapper, of maintaining his health and productivity and of providing the transportation and financing upon which his activities depend. The limiting factors affecting a solution of the problem were, therefore, shortage of supplies, transport and communication difficulties, and inadequate sources of labor to do the work required.

There were two schools of thought as to how these problems could best be solved. According to the authors, a point of view presented by the Board of Economic Warfare called for sweeping reforms in habits, customs and standards of living of the foreign peoples involved. The Rubber Reserve Corporation in association with the Reconstruction Finance Corporation presented a more moderate point of view which was put into operation. Working within the scheme of the local governments, transportation and communication facilities were improved, labor shifted to areas of greatest need, and precautions taken to safeguard the health and productivity of the worker.

In financing the production of rubber, to the greatest feasible extent, financing was done through private banks or through credit instrumentalities of the local governments, so that the United States would not be in the position of directly lending money to producers of rubber. These operational activities were carried on by the Rubber Development Corporation in cooperation with the Department of State and the embassies of the United States in producing countries.

Average Unit Costs

The authors emphasize that a recent report of the Reconstruction Finance Corporation discloses that during the period of the inter-American rubber agreements, a total of 153,545 long tons of wild rubber were received in the United States from the producing countries of Latin America at an over-all cost of $203,638,178, or at an average unit cost of 59.207 cents per pound delivered to United States ports. This actual cost was in wide variance with previous estimates which ran as high as $5.00 per pound.

This cost includes the purchase price of the rubber, plus applicable price premiums, plus all administrative expense in Washington and in the field, all development expense, all realized losses on loans, investments, equipment and other assets, interest on the capital used, and an average reserve against the book value of assets still outstanding as at June 30, 1947, of 84 percent. Even if all assets outstanding as at June 30, 1947, were written off and charged into the cost, the unit costs would only be increased by a fraction of a cent. It may be said, therefore, that the final cost of wild rubber received under the inter-American rubber agreements should work out to less than 60 cents per pound delivered to United States ports.

The above figures do not take into account rubber produced in the agreement countries not exported to the United States as crude rubber, which it is estimated aggregated upwards of 80,000 long tons during the period of the agreements. Part of this quantity was used to supply the essential requirements for tires and tubes of the producing countries, and part was purchased by the Rubber Development Corporation in the form of tires and tubes and other rubber manufactured goods for import into the United States or for shipment to other countries of the Western Hemisphere, under allocation by the United States, to supply the essential requirements of these countries. Tires and tubes so purchased by the Rubber Development Corporation aggregated 1,421,121 units having a purchase value of $32,704,608.96.

The cryptostegia plantation project in Haiti, initiated and carried out pursuant to directive of the Board of Economic Warfare against the advice of Rubber Reserve Company and Rubber Development Corporation, which had nothing to do with wild rubber deliverable under the inter-American rubber agreements, resulted in the production of 5½ tons of rubber at a cost of $6,725,615.04, or $546 per pound. This project was liquidated by the Rubber Development Corporation early in 1944 because of the negligible production of rubber to that date, and because it was estimated that to carry the project through 1946 an additional $7,000,000 would have to be spent, and because rubber obtainable from the project through 1946 was estimated at less than 1,000 tons.

From Liberia, almost entirely from plantations of the Firestone Tire & Rubber Company, there was obtained during the period 64,344 long tons of crude rubber at a cost of $44,111,649.33, or 30.605 cents per pound, and 22,763 long tons of latex at a cost of $20,146,304.95, or 39.510 cents per pound.

It was the consistent opinion of the Rubber Development Corporation, say the authors, that the wartime development of Latin American rubber was a necessary expedient. The corporation opposed long-term rubber projects unlikely to produce any substantial quantity of rubber during the anticipated period of the war. The corporation had informed the Latin American governments that in its opinion wild rubber should be regarded as a wartime venture, and that wild rubber would prove non-competitive and uneconomic from a world market standpoint.

Stockpiling Is Recommended

In conclusion, the authors contend that wild rubber in this hemisphere should not be depended upon except as a last resort, since the cost is uneconomic and production cannot be rapidly expanded. On account of many fundamental factors, it appears doubtful any large scale plantation production of rubber is likely to be developed in this hemisphere. The United States is likely, therefore, to continue to be dependent upon Far Eastern sources for the major part of its essential requirements of natural rubber.

Under such circumstances, it would seem as though the maintenance of an adequate stockpile of natural rubber is the least expensive and the most certain way of assuring our essential requirements of natural rubber in the event of an emergency which might again cut off our access to Far Eastern sources. (NOTE: Copies of the summary may be obtained from the authors at $1.00 each. Address Douglas H. Allen, 222 Eleventh Avenue, New York 1, N. Y.).

Koppers Isopropyl Phenols

The Chemical Division of Koppers Co., Inc., Pittsburgh, Penna., is now offering commercial quantities of isopropyl phenols. The isopropyl phenols are now produced in three grades: ortho-Isopropyl Phenol, a relatively pure ortho isomer; meta, para-Isopropyl Phenol, a close-boiling mixture of the meta and para isomers; and Di-isopropyl Phenol, a mixture of the dialkylated phenols. The isopropyl phenols have been found to have several promising uses. The alkyl phenols themselves are powerful high-boiling solvents which are valuable for certain wire-coating operations. The phosphate esters offer promise as plasticizers for vinyl resins and related materials. Other uses suggested include the manufacture of phenolic surface coating resins and the production of rubber processing chemicals.

Flame Resisting Oil Tank

A new type aviation oil tank said to be capable of withstanding fire and temperatures of 2000° F. has been developed for the United States Navy by the B. F. Goodrich Co. The container is also bullet-sealing, which increases its value for use in naval aviation. An outer coating in which synthetic rubber is combined with other materials gives unusual resistance to heat and fire, greatly increasing the safety factor of fuel cells in combat aircraft. The new tank is rigid and considerably lighter than other fuel cells. Goodrich said that the coating material used may be applied also to gasoline tanks and other containers for volatile fuels. Other applications include fuel tanks for automobiles, buses and trucks.

Marks Tenth Anniversary

Eric Bonwitt, dealer in used machinery for the rubber and allied industries, with headquarters at 431 South Dearborn St., Chicago 5, Ill., is completing his tenth year of activity in the United States. Born in the European "rubber capital," the City of Hanover, Mr. Bonwit entered the rubber industry at the turn of the century and formed his own organization shortly after World War I. Coming to Akron, Ohio, in 1938, he established his own firm in this country one year later, moving to Chicago a few years ago.

NAMES IN THE NEWS

G. ROGER MCNEAR, associated with the U. S. Rubber Co. since 1933, has been appointed assistant to the president of the company, succeeding WILLIAM M. DOUGHERTY who was recently elected secretary of the company.

DR. HOWARD I. CRAMER, director of development for Sharples Chemicals Inc., and chairman of the Rubber Division of the American Chemical Society, has been appointed to the advisory board of *Industrial and Engineering Chemistry* and *Chemical Engineering News*.

E. A. ROBERTS, tire engineer in charge of passenger car tire design for the Firestone Tire & Rubber Co., has been assigned to the Detroit, Mich., area as resident engineer.

A. H. RUDE, vice-president of the Aerojet Engineering Corp., a subsidiary of the General Tire & Rubber Co., has been named executive vice-president of the company and managing director of General's California operations, succeeding DAN A. KIMBALL who was recently appointed Assistant Secretary of the Navy for Air.

WALTER J. BEACH, formerly associated with the B. F. Goodrich Chemical Co., recently joined the Colonial Rubber Co., Akron, as development compounder on rubber and plastics.

HAROLD E. ADAMS, formerly with the Armstrong Cork Co., has joined the physical chemistry section of the Firestone Research Laboratory in Akron.

EDWARD G. DRISCOLL, until recently technical superintendent of the Rome, N. Y., plant of the General Cable Corp. is now affiliated with the engineering department of the Habirshaw Wire & Cable Corp. at Yonkers, N. Y.

GEORGE H. KENT, formerly director of sales planning and general economics for the Koppers Co., Inc., was recently appointed director of sales of E. F. Drew & Co., Inc., New York City.

ALDEN H. BURKHOLDER, associated with Industrial Rayon Corp. since 1929, and assistant research manager since 1944, has been named manager of rayon research for the corporation.

DR. D. J. BEAVER, research director at Monsanto Chemical Company's Nitro, W. Va., plant since 1942, has been transferred to company headquarters in St. Louis, Mo.

VICTOR ROZEN, president of the Triple City Rubber Co., Inc., has been elected vice-president of the Scrap Rubber Institute.

HILDING H. ANDERSON, who joined the Norton Co., Worcester, Mass., some 16 years ago, has been appointed chief buyer for the company.

DR. WARREN L. MCCABE, director of research of the Flintkote Co., has been elected a vice-president in charge of research for the company. He is also vice-president of the American Institute of Chemical Engineers.

EDWARD X. TUTTLE, director of foreign operations of Giffels & Vallett, Inc. and L. Rossetti, of Detroit, Mich., and director of its Eastern Division, is currently on a tour of the Orient and Europe to survey problems of industrialization and reconstruction.

B. FRANKLIN CONNER, executive vice-president of Colt's Manufacturing Co., Hartford, Conn., has been elected president of that company, succeeding GRAHAM H. ANTHONY, who has been named chairman of the board.

WAYNE F. NELSON, formerly manager of the Depew, N. Y., plant of the American Container Corp., has been transferred to the main office at Huntington, West Va., where he will be in charge of research and engineering.

J. D. MILLER, associated with the Elkhart Rubber Works for the past twenty-five years as chief chemist, recently left that company and is now general manager of the Skinner Bros. Rubber Co. in Dallas, Texas.

GEORGE D. SEGUIN, formerly purchasing agent of the Norton Co., Worcester, Mass., has been appointed general purchasing agent, succeeding the late PAUL FIELDEN.

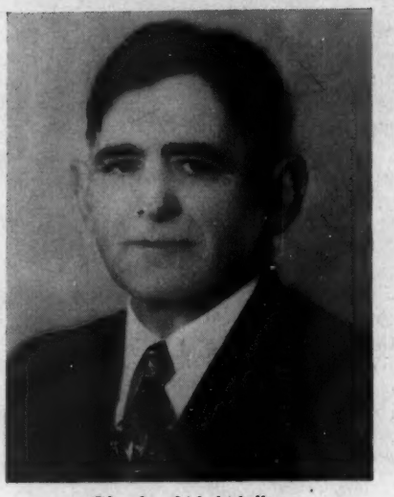
HARVEY H. HOLLINGER, associated with the Firestone Tire & Rubber Co. since 1913, and presently treasurer of the organization, has been elected a director of the Firestone Bank.

M. H. ARVESON, formerly senior technologist of the chemical products department of the Standard Oil Co. (Ind.), has been named technical director of the Indoil Oil Co., Chicago, which has taken over the activities of the department.

HARRY L. EBERT, associated with the Akron plant of the Firestone Tire & Rubber Co. for many years, has been transferred to the Fall River, Mass., plant as laboratory manager, succeeding JOHN ALLEN, who has been transferred to Akron.

ARNOLD BENJAMIN, formerly associated with the Pantasote Co., is now affiliated with the Standard Coated Products Division of the Interchemical Corporation at Buchanan, N. Y.

Retires After 38 Years



Charles W. Walker

As briefly announced last month in this journal, Charles W. "Doc" Walker has retired after 38 years with the Electrical Cable Works of the American Steel & Wire Co., a U. S. Steel subsidiary. He started with the South Works of the company in 1911 as a rubber chemist and has occupied the position of chief rubber research chemist at the Worcester, Mass., plant for many years.

Born in Yarnell, Penna., Mr. Walker was graduated from Penn State College in 1907. His first job was with the General Electric Co. at Schenectady, N. Y., where he was designated as an analytical rubber chemist. In 1909 he joined the New Jersey Car Spring and Rubber Co. in Jersey City, N. J., as chief chemist, and two years later went with American Steel & Wire Co.

One of the pioneers of the insulated wire field, Mr. Walker has several achievements to his credit during his long association with American Steel. Thirty-four years ago he developed what was and still is regarded as the world's best insulation for submarine cables. In 1916 he originated and developed a method of rubber analysis for wire insulation and other products which was accepted as a standard for the industry. During World War II he contributed heavily toward the development of satisfactory insulations using synthetic rubber.

In his 38 years with American Steel Mr. Walker has represented the company in numerous associations, including the American Chemical Society, American Society for Testing Materials, and the American Standards Association. He was also a member of the Joint Rubber Insulation Committee. He is married, and has one daughter. After a lengthy vacation in Florida, Mr. Walker plans to pursue his major hobby—gardening.

GEORGE B. HORN, formerly secretary and assistant general manager of the Wheeler Insulated Wire Co., Inc., Bridgeport, Conn., has been appointed vice-president. GEORGE T. MUMAW has been appointed secretary and treasurer.

Heads Export Technical Service

Raymond J. Hull

Raymond J. Hull has been named manager of Export Technical Service of the Philblack Sales Division, Phillips Petroleum Co., with headquarters in New York City. Mr. Hull will devote a major part of his time in supplying direct technical service to Philblack customers throughout the world. He will be associated with Dr. H. W. Grote, director of Philblack export sales. Mr. Hull received his B.S. degree in chemical engineering from Purdue University in 1927. Immediately upon graduation, he was employed by the B. F. Goodrich Co., where he held many important positions. During the war years he was on loan to the Rubber Director's Office of the War Production Board as head of the Tire and Tube Specification Section. Subsequently, he returned to Goodrich as manager of Airplane Tire Construction and Design and served as a representative of that company on various industry committees cooperating wtih the Armed Services in the development of tires for new aircraft. More recently, Mr. Hull has been production manager in charge of six Goodrich service departments, covering many tire and tube manufacturing operations. From August, 1947, to November, 1948, he served as factory manager in the startup operations of the new tire and tube factory located in Loosduinen, Holland.

Continental Names Seligman

Witco Chemical Co. has announced the election of H. B. Seligman as vice-president of the Continental Carbon Co. and the Witco Carbon Co., two subsidiary companies. Mr. Seligman was formerly treasurer of the parent company. He was also elected a member of the board of directors of Witco Carbon. In addition, Max A. Minnig, manager of the Gas Department of Witco Carbon, and John H. Wishnick, associated with the Engineering Division of Witco Carbon, have been elected directors of that company. Mr. Seligman has taken up headquarters in Amarillo, Texas.

Goodyear Division Reorganized

The Mechanical Goods Sales Division of the Goodyear Tire & Rubber Co. has been completely reorganized as to its field supervision with the creation of 4 new sales divisions. The new organizational change will reduce the size of territories to be controlled by division managers.

The new Eastern Sales Division, consisting of the Boston, Mass., New York, Pittsburgh, Penna., and Cleveland, Ohio, areas will be under the direction of O. A. Schilling. The Central Sales Division, comprised of Chicago, Ill., Detroit, Mich., Minneapolis, Minn., and Cincinnati, Ohio, will be under the supervision of H. E. Langdon. R. B. Warren will take over the Southern Sales Division which includes the Charlotte, N. C., Atlanta, Ga., St. Louis, Mo., and Dallas, Texas, districts. R. G. Abbott will continue to operate in the capacity of district manager in Los Angeles, Calif., and will head the Western Sales Division.

Mr. Schilling, Eastern sales manager, joined Goodyear in 1939, starting as a field representative in Houston, Tex. He became district manager of the Dallas, Tex., district in 1941, a post he held until 1947 when he became Eastern sales manager. Mr. Langdon has been associated with Goodyear for the past 29 years. He has served with Mechanical Goods Sales since 1921. R. B. Warren joined Goodyear in 1927. He was manager of the Pittsburgh, Penna. district before his new appointment. R. G. Abbott joined Goodyear in 1926 and since 1934 has been associated with the Mechanical Goods Sales Division.

Plastics Engineers Hear Ferriot

The March dinner meeting of the Central Ohio Section of the Society of Plastics Engineers was held on March 10 at the Hotel Berwick, Cambridge, Ohio. The speaker of the evening was J. V. Ferriot, vice-president of Ferriot Bros., Inc., Akron, Ohio. Mr. Ferriot discussed the techniques involved in pressure casting molds from Tombasil and Beryllium copper alloys. Molds formed with these materials were said to capture accurately many fine details from the model, giving nearly perfect reproduction in molded items. This type of mold fabrication is particularly suited for molds to produce rubber and plastic dolls and fine decorative items. With proper handling, the life of this type of mold was claimed to be equal to machine fabricated steel molds.

New Minnesota Mining Plant

The Minnesota Mining & Manufacturing Co., St. Paul, Minn., has announced the beginning of production at the former Plancor Plant No. 80 at Bristol, Penna., purchased last summer from the War Assets Administration. Robert N. Wolfe is manager of the unit which will manufacture adhesives and coatings. The plant presently employs 40 persons. Ultimate production plans, however, call for the employment of about 350 workers. Other lines, including adhesive tapes, are scheduled to go into production about May 1.

Scheer Named General Manager

Walter E. Scheer

Warwick Chemical Co., a division of the Sun Chemical Corp., has appointed Walter E. Scheer as general manager of its newly created Organic Chemicals Department, with headquarters at the main office of the company at 10th Street & 44th Avenue, Long Island City 1, N. Y. Mr. Scheer has been a chemical consultant for the past several years and president of Scheer Chemical Co., Inc. Before that time he was associated with the Hardesty Chemical Co., Inc., and its affiliate, Amecco Chemicals, Inc., where he was vice-president in charge of sales. The Organic Chemicals Department will concentrate on production of industrial organic chemicals for all industries, and on the development of household, industrial and other non-textile uses for synthetic detergents and other surface-active agents now widely sold in the textile field by the Warwick Chemical Division. New production facilities for the Organic Chemicals Department are being installed at Warwick's plant at Wood River Junction, R. I., and large scale commercial production of several new products is expected to begin in the very near future.

Bartlett Named Factory Manager

Frederick S. Bartlett, formerly assistant factory manager of the Bristol, R. I., plant of the U. S. Rubber Co., has been named factory manager of that plant. Mr. Bartlett began his rubber career 23 years ago as a chemist in the laboratory of the Bristol plant. He developed a process for insulating wire with rubber by dipping the wire in natural rubber latex. He holds a patent on a mechanical applicator for applying latex to wire. In 1937 he became chief chemist of the Bristol plant and in 1940 was named development manager. In 1944 he was named assistant factory manager, the position he held until his present appointment. Born in Westfield, Mass., he received his B.S. and M.S. degrees from the University of Massachusetts. He is president of the Bristol, R. I., YMCA, vice-president of the Bristol Community Chest, and vice-chairman of the Rhode Island Rubber Club.

FINANCIAL NEWS

General Cable Corp.

Year Ended December 31: Net income of $4,131,742, which is equal to $1.75 a common share, compared with $6,158,266, or $2.79 a share, in 1947. Balance sheet items as of December 31, 1948, reveal current assets of $25,299,310 and current liabilities of $7,067,576 compared with $28,509,051 and $7,402,517, respectively, at the end of 1947. Figures for current liabilities reflect a deduction of U. S. Treasury notes in the amount of $2,435,523 in 1948 and $3,646,219 in 1947. Capital expenditures for new equipment and plant modernization approximated $4,500,000 during 1948.

Thermoid Company

For 1948: Net income of $1,040,469, which is equal to $1.20 per common share, against $963,468, or $1.21 a share the year before. Net sales for 1948 amounted to $23,628,913, compared with $22,677,652 in 1947. Balance sheet items as of the end of 1948 indicated current assets of $8,935,349 and current liabilities of $4,407,456, against $8,594,105 and $4,504,915, respectively, at the end of the previous year.

Dunlop Tire and Rubber Goods Co.

For 1948: Net profit of $244,530, which compares with a net profit of $388,497 for 1947. The consolidated balance sheet as of December 31, 1948, reveals current assets of $5,788,355, and current liabilities of $2,377,350. At the end of 1947, current assets were $4,586,243, and current liabilities were $1,245,162.

Thiokol Corporation

For 1948: Net income of $52,371, which compares with a net income of $96,780 the year before. As of December 31, 1948, total current assets were $871,702 and total current liabilities $122,181, compared with $760,264 and $100,849, respectively, at the end of 1947.

Cooper Tire & Rubber Co.

For 1948: Net loss of $133,670, compared with a net income of $145,976, or 93 cents each on 156,721 shares of common stock in 1947. Net sales in 1948 amounted to $7,769,063, against $11,080,712 in 1947.

Gro-Cord Rubber Company

For 1948: Net income of $143,682, which is equal to $1.31 a common share, and which compares with $61,526, or 56 cents a share, reported for the previous year.

Columbian Carbon Co.

For 1948: Net income of $6,504,865, which is equal to $4.03 a share, compared with $6,064,196, or $3.76 a share, in 1947. Net sales of $42,920,977 in 1948 were 4.4% over sales of $41,106,104 for the previous year. Sales of carbon black totaled 280,717,768 pounds, a decrease from 1947 which reflects the drop in total rubber consumption in 1948. The report states that beginning soon after mid-year the supply of all types of carbon black became sufficient to meet demands in full.

American Hard Rubber Co.

For 1948: Net income of $499,801, which is equal to $4.35 a share, against $623,232, or $5.75 a share in 1947. Net sales for the year amounted to $16,378,006, against $17,696,471 in 1947. More than $958,000 was invested in plant improvements during 1948. Totals include figures for a wholly-owned subsidiary, Pequanoc Rubber Co., Butler, N. J.

De Vilbiss Company

Year Ended December 31: Net profit of $947,967 which is equal to $3.16 a share, compared with $938,891, or $3.13 a share, in 1947. The profit for 1948 reflects a figure after an appropriation of $275,000 which was carried to inventory reserve. Net sales for 1948 totaled $15,745,922, against $16,294,049 for 1947.

Minnesota Mining & Mfg. Co.

For 1948: Net income of $13,234,756, which is equal to $6.51 a share on the 1,972,845 shares of stock outstanding, compared with $10,715,376, or $5.47 each on 1,951,530 shares, in 1947. Net sales for 1948 amounted to $108,246,410, against $93,437,137 in 1947.

Mansfield Tire & Rubber Co.

For 1948: Net income of $1,327,046, which is equal to $8.12 a common share, compared with $1,965,483, or $12.13 a share, in 1947. Net sales for 1948 totaled $28,669,983, against $40,499,826 the year before.

Kerite Company

For 1948: Net income of $791,908, which is equal to $6.71 a common share, after establishing a $175,000 provision for inventory price declines, against $708,136, or $6.08 a share, in 1947.

National Rubber Machinery Co.

For 1948: Net income of $285,624, which is equal to $1.85 a share, against $472,148, or $3.07 a share, in 1947.

Intercontinental Rubber Co.

For 1948: Net loss of $1,022,512, after all expenses including provision of $880,897 for loss in advances to subsidiaries, which compares with a net loss of $354,063 reported for the previous year. A statement accompanying the report indicated that no rubber was produced at any of the three plants in Mexico for the last half of 1948 and that only 1,168,200 pounds of guayule rubber was produced during the year, as compared with 4,866,000 pounds in 1947. The Tucson, Arizona, ranch of the company was recently sold for $325,000 cash, less a 5% commission. An appraisal secured from an engineering firm has indicated that the Sumatra plantation of the company, which was repossessed last year, has practically no value.

Mohawk Rubber Company

For 1948: Net income after providing for expenses amounted to $388,528, equal to $2.74 per share, which compared with $499,619, or $3.53 a share, reported for the previous year. Net sales for 1948 amounted to $8,482,375 as compared with $8,242,956 in 1947, sales for the last six months of 1948 showing an increase of 42% over the first half period. Total current assets as of the 1948 year-end amounted to $3,156,139 and total current liabilities to $380,161. Net current assets or working capital of the company increased to $2,775,978.

Plymouth Rubber Company

Year Ended November 30: Net income of $159,167, or 17 cents a common share, against $1,126,226, or $1.25 a common share, for the fiscal year ended November 30, 1947. Sales for the 1948 fiscal year amounted to $10,631,190, compared with $11,221,941 the year before. The decline in profits was attributed to the rising costs of labor and materials with no corresponding increases in selling prices and to an increase in selling costs to maintain sales volume.

Norwalk Tire & Rubber Co.

Quarter Ended December 31: Net income of $13,029, which is equal to 6c a share, and compares with a net loss of $2,170 in the corresponding period of 1947. Net sales for the period ended December 31, totaled $1,848,169, against $1,948,899 for the same period last year.

New Jersey Zinc Co.

For 1948: Net profit of $9,435,814 after all deductions, including $1,000,000 provision for contingencies, which is equal to $4.81 a share, and which compares with $8,243,305, or $4.21 a share, earned in 1947 when a similar amount was provided for contingencies.

Garlock Packing Co.

For 1948: Net income of $1,369,581, which is equal to $3.27 a share, compared with $1,276,731, or $3.05 a share, in the previous year.

SATISFACTORY TOY OUTPUT INDICATED AT ANNUAL SHOW

Production in the over-all toy field at levels equal to the $300,000,000 high volume of 1947 and 1948 were predicted for the current year following the Forty-Sixth American Toy Fair held in New York City from March 7 to 18. A record number of 10,500 buyers visited the exposition this year and the production prediction was based on the volume of orders placed. As usual, headquarters for the show were at the Hotel McAlpin, with a number of showrooms maintained at the Hotel New Yorker in addition to the usual all-year showrooms. Some 1200 exhibitors displayed their wares.

Rubber toys and novelties were, of course, very much in evidence. Leading the rubber parade were dozens of different sizes and shapes of dolls, including the new Amosandra crying-drinking-wetting doll recently added to the Sunruco line featured by the Sun Rubber Co. Molded of tinted, chocolate-colored soft rubber, the Amosandra doll, which ties in with the famous Amos 'n' Andy radio program, is 10 inches tall and comes in a white flannel diaper, with her own nursing bottle, soap and soap dish, teething ring, hot water bottle, bell rattle, and a framed birth certificate.

Another outstanding new number was the Corabelle colored pigtail baby introduced by the Imperial Crown Toy Corp. Like the Midge doll featured by this company, the new doll has a latex body stuffed with foam sponge, has an unbreakable plastic head, and cries, drinks and wets. Corabelle is made in three sizes, 12, 15 and 19 inches, and comes dressed and undressed. Still another creation was Musette, a musical baby doll, with plastic head and rubber arms and legs, shown by the Vanity Doll Co.

Other companies exhibiting dolls of rubber or plastic, or combinations of the two materials included Nasco Doll, Inc., Goldberger Doll Corp., Natural Doll Co., Bell Doll & Toy Corp., American Character Doll Co., Ronnie Doll Co., and Eastern Rubber Specialties Co. Horsman Dolls, Inc., displayed a new Softee cry baby doll which cries when laid down and stops crying when picked up. The Sayco Doll Corp. showed its new Tubby Skintex doll. According to a report from the United States Testing Co. six of these dolls were immersed up to the neck in water and no water was found to have seeped through the joints into the doll bodies or extremities after 24 and 48 hours of immersion.

Numerous Rubber Novelties

Several new lines and numbers of rubber toys and novelties were on exhibition during the 1949 Fair. The Dewey and Almy Chemical Co. introduced its completely new line of float-and-crib toys, including the Darex Ducklings, sold in a packaged set of three, with a unique drainage design for keeping them fresh and clean. Other items in this line are a 7½-inch rabbit and a 6½-inch fish. Molded Latex Products, Inc., showed several new numbers in its Kaysam Joy Toy line, including Winky the Clown, Duck the Duck, and Snitch the Rabbit.

Its full line of molded rubber toys, including autos, trucks, racers, tractors, and farm sets and animals, was displayed by the Auburn Rubber Corp. Sun Rubber's display also included numerous molded novelties, including trucks and racers, as well as its line of soft rubber latex Disney toys, all equipped with new voices. An all-rubber feeding-teething spoon was also shown by this company.

Inflated rubber play balls, featuring new designs, were also very much in evidence. Midland Rubber Co. displayed its new line of play balls retailing at 5 to 25 cents, all featuring mottled designs and including return balls. Eagle Rubber Co. showed numerous gas-inflated and sponge balls, with eye-catching designs in bright, contrasting colors. Cellophane-wrapped, high color, high bounce balls were featured by the Barr Rubber Products Co., in addition to 6-inch variegated gas balls. This company also displayed its rubber pet toys, including two brand new items, one a puppy pipe and the other a heavy wall bell ball.

Several lines of rubber sports balls were on display, including lines featured by the W. J. Voit Rubber Corp., the Seamless Rubber Co., Seiberling Latex Products Co., and Weaver-Wintark. Sports balls featured by the latter company are made on the well-known Webb machines. Seiberling Latex also showed its lines of inflated balls, sculptured balls, baby dolls and dipped latex animal toys. Other ball lines on display included the Tilly playballs made by the Tillotson Rubber Co. and the sponge and gas-inflated balls made by the Fli-Back Co.

Colorful Balloon Lines

No toy fair would be complete without the exhibition of toy balloons and the 1949 exposition was no exception. Dozens of new balloon novelties were exhibited by various companies, with color running rampant. Among the numerous balloon lines shown were those by Barr Rubber Products Co., Eagle Rubber Co., Oak Rubber Co. and Bayshore Industries, Inc. The trend toward packaged balloons, or the sale of balloons in bulk, is continuing.

In addition to its regular balloon line, Oak Rubber displayed its line of Oak-Hytex inflatable rubber toys, all of which squawk when squeezed. The current line includes Donald Duck, Mickey Mouse, baseball, football and basketball players, and cowboys and Indians. The Eagle Rubber line includes bunny, mouse and varicrystal monkey toss-ups, all with inflatable ears. The Barr Rubber line features "Shmoo" toss-ups, as well as Tumbling Tabbies. Bayshore Industries showed its line of Jolly Jingle floating musical bath toys, as well as its line of balloons, including a new deluxe gift package holding four items.

An Index to Volume 64 of RUBBER AGE will be found on Pages 113 to 116 of this issue.

STANDARD SAMPLES AVAILABLE FOR RUBBER COMPOUNDING

The use of standard samples of compounding ingredients for the testing of rubber, inaugurated in 1943 by the Committee on Specifications for Synthetic Rubbers (Sponsored by the Office of Rubber Director and Rubber Reserve Company, now Office of Rubber Reserve) was a vital part of the Government Synthetic Rubber Program, which resulted in the outstanding improvements in precision and accuracy of testing in the Government synthetic rubber plants. The uniformity of synthetic rubber prdouction in recent years was made possible by the improvements made in testing rubber.

As an outgrowth of the successful use of standard samples in the Government Synthetic Rubber Program, the National Bureau of Standards has included seven of these standards among the standard samples regularly supplied to industrial and scientific laboratories.

Since June 1, 1948, the requirements of the specifications for Government Synthetic Rubbers have been predicated on the use of National Bureau of Standards Standard Samples for stress-strain testing of synthetic rubbers. These materials are also available to the manufacturers of rubber products for use as standards in testing in connection with the procurement of raw materials, process control, and inspection of product quality.

Orders for these materials should be sent to the Accounting Section, National Bureau of Standards, Washington 25, D. C. Samples must be paid for in advance with order. Money orders, etc., should be payable to the National Bureau of Standards. Shipments will be made express collect unless otherwise specified. The following materials are available in air-tight metal containers except Standard Sample 376 which is packaged in glass (orders should specify both number and name of sample wanted):

Standard Sample Number	*Name*	*Grams per package*	*Packages per carton*	*Price per package*
370	Zinc Oxide	2000	8	$1.65
371	Sulfur	1000	20	0.60
372	Stearic acid	600	1	1.20
373	Benzothiazyldisulfide	600	40	1.20
374	Tetramethylthiuram disulfide	600	1	2.25
375	Channel black	8000	4	3.50
376	Light magnesia	140	1	0.85

Polyco 350 Synthetic Latex

The American Polymer Corp., Peabody, Mass., has completed installation of new, high-pressure polymerization units which make possible large volume production of Polyco 350, a synthetic latex of interest to the rubber, paper and other industries. Polyco 350 is a stable dispersion of a flexible high styrene copolymer resin suitable as a replacement for casein in binding pigments in the manufacture of paper coatings, where its compatibility, toughness, flexibility and age resistance are said to be excellent. Polyco 350 is stabilized during manufacture to withstand most of the extremes of handling and machining operations. The dispersion is readily dilutable with water to reduce the working solids and viscosity.

LOS ANGELES NEWS

The highlite of the technical session which preceded the regular meeting of the Los Angeles Rubber Group held on March 1 at the Hotel Mayfair was a talk on "Cold Rubber Compounding and Processing" delivered by D. M. Sheppard, of the Goodyear Tire & Rubber Co. The talk was virtually a progress report on what has been discovered about processing and compounding of "cold rubber" to date.

According to Mr. Sheppard, compounding practices used with standard GR-S can be followed for "cold rubber" with little or no change, except for a small increase in accelerator demand, with resultant improvement in physical properties. Black loadings and requirements of zinc oxide and other chemicals are about equivalent.

The big advantages of the new polymers over standard GR-S stocks, the speaker said, lie in improved tensile, elongation, resistance to cut growth, and tread wear. Although most production to date has been in tread and camelback stocks, laboratory data indicates that "cold rubber" has good possibilities in mechanical goods, especially for improved tensile and smoothness of extrusion.

In processing, Mr. Sheppard continued, "cold rubber" has shown some differences from regular GR-S. Banbury requirements are a little higher for individual mixes, but total mixing time has been lower, with little improvement in extrusion noted upon adding remills over the minimum. The new polymers tube hotter, although smoother and with less shrinkage than regular GR-S. They tend toward reduced output per tuber screw revolution, sometimes as much as 35%.

In concluding, the speaker stated that excessive stiffness after cooling has resulted in some difficulties in applying "cold rubber" treads, although this tendency has not caused any trouble in molding.

The well established pyroxylin coating business may expect increased competition from vinyl plastics and especially those of the paste type within the next few years, George B. Koch, advertising manager of B. F. Goodrich Chemical Company recently told the West Coast section of the Society of Plastics Industry, at Santa Barbara, California.

The rapid growth of vinyl plastics for fabric coating has been significant during the last 10 years and one recent development in coating technique, the use of vinyl pastes, shows great promise of stepping up this growth, Mr. Koch said. Pastes are either plastisols or organosols, the former being dispersions of finely divided vinyl resin in liquid plasticizer without diluent and the organosols differing in that volatile diluents are included.

A typical case history was presented by Koch in which a company, engaged in the coated fabric business, changed over from pyroxylin coatings to vinyl organosols and finally to a plastisol formulation in which a Geon paste resin, known as 121, was the base material. Geon 121, manufactured by B. F. Goodrich Chemical Company, offers many advantages to users over organosol and solution systems in coating processes and for many operations its price makes it competitive with the calendering operation.

F. W. Woerner, formerly chief chemist of the Reeves Rubber Co., San Clemente, Calif., has been appointed chief chemist at Los Angeles Standard Rubber, Inc.

Howard Keefer, previously associated with the Huntington Rubber Co., has joined the Reeves Rubber Co. as chief chemist.

George Steinbach, manufacturer's representative and West Coast agent for Columbia Mills, Inc., to the rubber and allied industries, has formed a new company, the Merit Western Co., with offices at 1248 Wholesale St., Los Angeles 21, where he will maintain stocks.

B. E. Biheller, branch manager for H. Muehlstein & Co. in the Los Angeles area, has announced the completion of larger facilities to serve the rubber and allied industries at 3706 East 26th St., in Los Angeles.

Richard Zirker, associated with the Shell Chemical Co. for some time, has been named to head the company's new office at Portland, Oregon.

Frank Fargo, president of the Fargo Rubber Co., has sold his interest in the concern. H. M. Samson, formerly vice-president of the concern, has succeeded Mr. Fargo as president.

T. C. Dabovich has been appointed West Coast technical representative for Sharples Chemicals Inc., succeeding Dr. Lloyd E. Parks who has been transferred to Philadelphia, Penna., to become technical assistant to the vice-president in charge of sales. Mr. Dabovich has his headquarters with the firm of Martin, Hoyt & Milne.

J. C. Ballagh, vice-president of the Patterson-Ballagh Division of Byron Jackson Co., retired on April 1, after 22 years of service with the division.

D. M. Stoecker has joined the local offices of the Minnesota Mining & Manufacturing Co., succeeding Fred Horner who resigned recently to enter business for himself.

Fred W. Reiter, associated with the Pacific Hard Rubber Co., has been transferred to the Research Department as research chemist. Melvin A. MacDonald has been promoted to chief control chemist succeeding Mr. Reiter.

Mission Rubber Co., South Gate, Calif., has changed its corporate name to the North American Rubber Corp. Herman D. Rue is president of the concern.

A new factory for the manufacture of rubber footwear is rapidly taking shape in Garden Grove, Calif. The plant, when completed, will occupy about 70,000 square feet of manufacturing space. Considerable equipment has already been installed, including a No. 9 Banbury. Production is scheduled to get under way by June 1.

Announce Good-rite Plasticizer

The first Good-rite plasticizer to be marketed by the B. F. Goodrich Chemical Co., Cleveland, Ohio, will be known as GP 261. This new dioctyl phthalate plasticizer is said to be excellent for vinyl and other synthetic resins as well as for the nitrile type rubbers. According to the company, it imparts such desirable properties as heat and light stability, permanent flexibility, low temperature flexibility, resistance to hydrolysis, low water extraction and excellent electrical properties. The new plasticizer has a specific gravity of 0.986 at 20° C., a molecular weight of 390, a boiling range of 99% between 215 and 250° C. at 4 mm, a freezing range from —50 to —55° F., and a refractive index of 1.485. It is completely soluble in gasoline, benzene, mineral oil and toluene, and very slightly soluble in glycerine and diethylene glycol.

Introduce New Type Lithopone

Albalith-73, a new type of lithopone, which is coated with fatty acids and therefore mixes more quickly and aids tubing, calendering and spreading, was recently introduced by the New Jersey Zinc Co., 160 Front St., New York 7, N. Y. The new lithopone is also reported to provide higher tensiles and better tear resistance because its better dispersion produces more interfacial area of contact with the rubber. Samples of the new material are available on request to the company.

Pigment Color Prices Reduced

A price reduction on all lead-containing inorganic pigment colors was announced recently by E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. The cut has been applied to all shipments made on and after March 17. The price of chrome yellows and chrome oranges was lowered one cent a pound. Molybdate oranges and chrome greens were reduced one-half cent a pound. Company officials stated that the price reductions were made possible by recent cuts in the price of lead.

NEW RUBBER GOODS

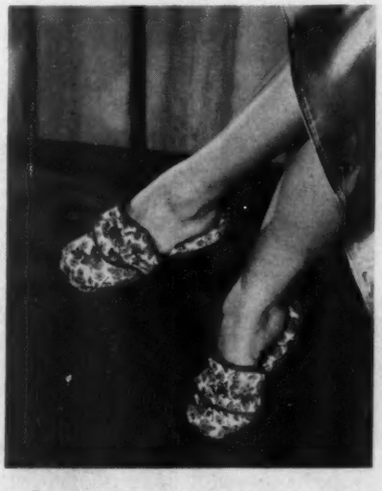
Children's Boots of Vinylite

Boots of brilliant red and white Vinylite plastic, that the kindergarten set can pull on by themselves, have been introduced by Plasti Industries, Inc., Winona, Minn.

Scuff and wear resistant, the new boots can be wiped shiny in an instant, and their attractive colors never fade. Available in three styles, low overshoes and ankle-high puddlers, as well as boots, these lightweight protectors come in red and combinations of white with red, blue or green.

Angel Tread Bedroom Scuffs

Angel Tread bedroom scuffs, featuring soles made of Firestone Foamex (foamed latex), have been introduced by the R. G. Barry Corp., of Columbus, Ohio. Made



in a wide range of designs and in three sizes, the scuffs are said to be light, extremely comfortable and easily cleaned. Since foamed latex is highly resilient, the soles cling to the heel in walking, and there is no flapping action.

Studded Tires for Bicycles

A bicycle tire designed for use in snow, mud and other heavy going has been announced by the Goodyear Tire & Rubber Co. Termed the "Studded" tire, the new unit gets its name from the heavy blocks or "studs" deeply etched in both its tread and shoulder so as to furnish the maximum in non-skid and traction. The tire is intended primarily for motor-bikes and other types of bicycles needed for year 'round operation. It is manufactured in both the 24 x 2.125 and 26 x 2.125 sizes, in black sidewalls only.

Inflatable Vinylite Boats

Bilnor Corp., 71 Baruch Place, New York 2, N. Y., has announced production of a new inflatable boat having a wide variety of uses and available at a fraction of the cost of the conventional type row boat. This is made possible through new designs and techniques for producing these

low-cost boats from Vinylite plastic. The boats are available in two sizes, 72 and 56 inches from stem to stern. The 72-inch boat weighs five pounds inflated and comfortably carries two adults and two children, the manufacturer says. The 56-inch boats holds two young children, or one person up to about 16 years old, and weighs two pounds inflated. The 72-inch boat has four separate side air chambers and a double bottom. Propelled with either a double paddle or canoe paddle, these inflated boats are said to travel faster wtih less effort than the conventional type boats of similar size.

De-Icer Out-of-Door Step

A unique type of out-of-door step, called the De-Icer, is now in production by the Northeastern-Malden Barrel Co., Inc., 96-104 Suffolk St., Malden, Mass. The product is a corrugated mat whose center is composed of foam sponge rubber. The edges are sealed so it will not absorb water. The makers point out that after snow or icy weather has occurred, the user simply walks up and down on the mat, cracking the ice. The mats are made in two sizes, 24 x 9½ inches, and 24 x 11¾ inches wide.

Goodyear Hard Rock Rib Tire

A new type tire has been added to the truck tire line of the Goodyear Tire & Rubber Co. Known as the Hard Rock Rib, the tire is currently being manufactured in three sizes, including 12.00 x 24,

13.00 x 24 and 14.00 x 24. The tire is designed especially for front wheel service in heavy construction, excavation and strip mining and is expected to help eliminate hard steering and vibration encountered in these types of operations. Tread design of the new tire consists of three, heavy circumferential ribs, with the shoulder pattern resembling that of the company's standard Hard Rock Lug tire.

Alternating Pressure Mattress

A mattress that gently massages the pressure areas of the body of a bedridden patient, and thus reduces the danger of bedsores, has been announced as the joint development of the Firestone Plastics Co.

and the H. J. Rand Foundation, Cleveland, Ohio. The mattress, constructed of Velon, Firestone's plastic film, consists of a series of air cells 1¼ inches in diameter running its width transversely. Alternate cells are connected to a manifold which forms the edge of the mattress. The two systems of interspersed cells are alternately deflated and inflated at short intervals by a small electrically driven pump. This action produces a massaging effect on the patient's body. Clinical tests have been made with the mattress since July, 1947, with very satisfactory results reported.

CANADIAN NEWS

Dominion Rubber Co., Ltd., reports that its 1948 net profit was off 37% from the previous year. Although the year witnessed the return of competitive selling conditions in the rubber industry, sales were up 7% and represented a record volume. Increase is attributable in no small measure to new production facilities installed during the postwar period, it was said.

Higher level of wages, materials and other costs without compensating higher selling prices served to reduce profit margins on the sales of most products, it is stated. Although production methods were further improved during the year, the resulting economies were insufficient to offset the continuing pressure of rising costs.

Capital expenditures for plant, buildings and equipment amounted to $654,000 and included purchase of the warehouse at 496 Queen St., E. Toronto, under lease since 1941. These facts, together with a large investment in accounts receivable, contributed to the depletion in the company's cash resources and created the need for obtaining bank loans for the first time since 1941.

Canadian Lastex, Ltd., in which the company holds a 50% interest, experienced another year of satisfactory operations despite a sharp curtailment of export sales. Itarco, Ltd., a wholly owned subsidiary, was incorporated during the year for the purpose of producing and selling in Canada certain products of India Tire and Rubber Co., Inchinnan, Scotland, under agreement with that company.

The traditional pattern of sales in the tire and automotive products division was somewhat reversed in 1948 and peak demand usually expected in the spring and summer months did not occur until fall. Unfounded rumors of Government restrictions and controls on the distribution of tires brought about a sudden and unseasonal demand, with the result that tire inventories fell and production had to be stepped up to restore the position. The industrial rubber products division enjoyed another year of unprecedented volume and only during the latter months could production satisfy demand.

Further increases in building costs and the effects of the restriction on the importation on goods from the United States, influenced management to postpone plans for a major plant expansion at Whitby, Ontario.

During the year the company's liability for income and excess profits taxes for the period 1942 to 1946 inclusive was agreed with the Department of National Revenue and the tax provision in excess of requirements totaling $106,000 was transferred to surplus. The adjustment in respect of excess profits taxes resulted in a reduction of $37,000 in the refundable portion of taxes.

March 24 marked the formal opening ceremonies of the new molded rubber goods factory of the Goodyear Tire & Rubber Co. of Canada, Ltd., at Quebec. This plant, which has an area of about 172,000 square feet and presently employs approximately 200 workers, is the newest addition to Goodyear's six Canadian factories. One of the features of the new plant is that manufacturing operations are carried out on one large floor.

The opening ceremonies at the factory began with the blessing of the parish priest of St. Malo de Paties, in which the factory is located. Immediately following the blessing of the plant, A. Hurst, factory manager, welcomed some 500 guests who were gathered in the factory building. This group included the plant employees as well as leaders in Federal, Provincial and Civic Governments. J. R. Deschamps, manager of the Eastern Quebec Division of Goodyear's Sales Department, acted as master of ceremonies.

P. W. Litchfield, chairman of the board of the parent company, Akron, Ohio, was present, as was E. J. Thomas, president. A. G. Partridge, president of Canadian Goodyear, R. C. Berkinshaw, vice-president and general manager and A. W. Denny, vice-president in charge of production, were also present at the opening ceremonies. A. G. Cameron, president of the Goodyear Export Co., and G. K. Hinshaw, manager of Goodyear foreign plants' operation, were also on hand.

Addresses were given by Mr. Litchfield and by Mr. Berkinshaw, who spoke to the gathering in French on the significance of the new plant in the life of the community and in the Goodyear company's operations. Following the ceremonies, a reception was held at the Chateau Frontenac Hotel for Goodyear personnel and their guests.

Canadian Goodyear's New Molded Rubber Goods Factory at Quebec

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Re-education of the world's people in the simple concepts of government and economics was the one way in which today's dangerous fallacies could be wiped out, J. P. Seiberling, president of the Seiberling Rubber Co., recently told the Canadian Club at the Royal York Hotel in Toronto.

Four "D's"—the Demagog, Dogooder, Deceiver and Dictator—today were ruling the people who had become frightened by the vast changes of the last thirty years, said Mr. Seiberling. The most dangerous fallacy they had spread was that security was more desirable than freedom.

Politically, many people thought the idea of centralization and enlargement of their governments was good, he said. This was despite the fact that history had proved it bad. "Vast power always made for tyranny," he stated.

There was another fallacy abroad which was doing as much damage—the idea that it was the responsibility of the government to support the people. The true responsibility of the government, he said, was to help the people to support themselves by non-interference in their business.

Progressive taxation based on the ability to pay was attacked by Mr. Seiberling as yet another instance in befuddled thinking. "Any taxation which penalizes the successful producer of wealth penalizes the successful production of wealth," he declared. "It is the morality of Karl Marx."

Former Gutta Percha & Rubber Co. executive Fred R. Sutherland, 69, died recently at the Oakville Temporary Hospital. He had been ill seven months.

Born in Toronto, Mr. Sutherland retired in 1942. He joined Gutta Percha shortly before going west in 1913 to open a wholesale branch for the firm in Edmonton. He was manager of the branch until his retirement.

Mr. Sutherland resided in Victoria, B. C., for two years following his retirement, and for the past four years has lived with his daughter, Mrs. Douglas Caldwell, in Oakville.

OBITUARIES

Leo V. Kenward

Leo Victor Kenward, vice-president of the Institution of the Rubber Industry and of the Research Association of British Rubber Manufacturers, died at Haywards Heath, Sussex, England, on February 23, at the age of 62. Mr. Kenward was born at St. Leonards-on-Sea on June 20, 1886, and was educated at Tudor Hall, Kent. He joined Dunlop at the age of 21, and became works secretary at the Aston Cross plant in 1919.

In 1923 Mr. Kenward was appointed operating superintendent at Fort Dunlop as well as works secretary and was named general sales manager a year later. He played a leading part in the establishment of the Fort Dunlop Joint Factory Council, and was its first chairman. From 1926 to 1928 he was sales controller at Dunlop's London headquarters and was largely responsible for the coordination of the Macintosh group when it was acquired by Dunlop. In 1930, Mr. Kenward became general manager of Dunlop's subsidiary companies, a position he held until his appointment as director of the rubber products group in January, 1940.

Mr. Kenward was chairman of the India Rubber Manufacturers' Association from 1929 to 1933 and became the first president of the Federation of British Rubber Manufacturers' Associations at the time of its inception in May, 1942. He retired from active service with Dunlop that same year. Funeral services were held on February 26. He is survived by his wife, a son and a daughter.

William T. Exton

William T. Exton, who retired one year ago as general manager of the Rubber Division of the Ball Brothers Co., Muncie, Ind., died at his home in Muncie on March 15 at the age of 61. He was a native of Trenton, N. J., and made his start in the rubber industry at the age of 16 with the Hamilton Rubber Co. in that city. In 1912 he moved to St. Louis, Mo., to establish the Rubber Division of the Cupples Co. After leaving this company in 1929, he installed the Rubber Division of the Crunden Martin Manufacturing Co., St. Louis, Mo., and for a short period was with Jenkins Brothers Co., Bridgeport, Conn., in an advisory capacity. Mr. Exton joined Ball Brothers in 1933 to establish their Rubber Division. He was a member of the Masonic Lodge, including Muncie Commandery 18, Knights Templar, and the New York, Chicago and Detroit Rubber Groups. Funeral rites were conducted on March 18 at Meeks Mortuary in Muncie, with interment at Riverview Cemetery, Trenton, N. J. His wife, three daughters and a son survive.

Clifton Slusser

Clifton Slusser, vice-president of the Goodyear Tire & Rubber Co., and recognized as one of the nation's leading production experts, died on March 25, in City Hospital, Akron, Ohio. He was 56 years old. In failing health for a number of years, Mr. Slusser relinquished his position on the board of directors of the company and most of his arduous production duties two years ago. Born in West Brookfield, Ohio, on May 28, 1892, Mr. Slusser joined the Goodyear organization in August, 1911. He was first employed as a clerk in the office of Paul W. Litchfield, chairman of the board and chief executive officer of the company, who was then company superintendent. Following service as a stenographer in the factory organization, Mr. Slusser organized the company's Squadron, a training organization which since that time has produced hundreds of trained personnel occupying key positions in all branches of the company's activities. When the company expanded operations by constructing a plant at Los Angeles, Calif., in 1920, Mr. Slusser was named superintendent in charge of production. He returned to Akron two years later as factory staff manager. Four years later he was elevated to a vice-presidency, and in 1932 was named to the board of directors. Under his direction, new factories were established in England, Argentina, Java, Brazil, Sweden, Mexico, Peru and China. He was a 32nd degree Mason and a member of the Portage Country Club in Akron. His wife and son survive.

Edwin M. Berolzheimer

Edwin M. Berolzheimer, chairman of the board and former president of the Eagle Pencil Co., New York, died on March 15 at his winter home, Davant Plantation, Ridgeland, S. C. He was 62 years old. Born in New York, Mr. Berolzheimer was a grandson of Daniel Berolzheimer, who founded the Eagle Pencil Co. in 1856. He prepared for college at Phillips Exeter Academy, and in 1908 was graduated from Harvard University. In the first World War. Mr. Berolzheimer served as a captain in the Ordnance Department, U. S. Army. Previously, he had made an early start with Eagle Pencil, and on his return to civil life he took the post of factory superintendent. He was elected vice-president in 1921, president in 1925, and he retained the presidency until 1946 when he became chairman of the board. At his death, Mr. Berolzheimer was also chairman of the board of the Hudson Lumber Co., San Leandro, Calif., and a member of the advisory board of the Chemical Bank & Trust Co. He was also a member of the National Panel of Arbitration, and a life member of the New York Society of Military and Naval Officers.

Willard H. Dow

Dr. Willard H. Dow, president and chairman of the board of the Dow Chemical Co., Midland, Mich., died in an airplane crash on March 31, near London, Ont., Canada. His wife and three other persons were killed in the same crash. He was 52 years old.

Dr. Dow was born January 4, 1897, at Midland, Mich., the son of Dr. Herbert Dow, founder of the company. He received his early education at Midland High School, and attended the University of Michigan where he received a bachelor of science degree in chemical engineering in 1919. In 1922 he became a director of the company and four years later was named assistant general manager. On the death of his father in 1930 he assumed the duties of president and general manager and in 1941 he became board chairman.

Last October, Mr. Dow received the Medal for the Advancement of Research, an award of the American Society for Metals. In November, 1946, he received two medals. One was from the Society of the Chemical Industry for conspicuous service to applied chemistry, and the other from the magazine *Science* in recognition of his scientific contributions during the war years.

Dr. Dow was a member of the Chemical Advisory Committee, Army and Navy Munitions Board; a member of the Chemical Warfare Service Advisory Board; a director of the American Chemical Society, and a member of the American Institute of Chemists and the Society of the Chemical Industry, as well as a member of the corporation of the Massachusetts Institute of Technology. He was a thirty-third degree Mason, and he held many scientific and honorary degrees. The Dows are survived by a son and a daughter.

Joseph A. Faucher

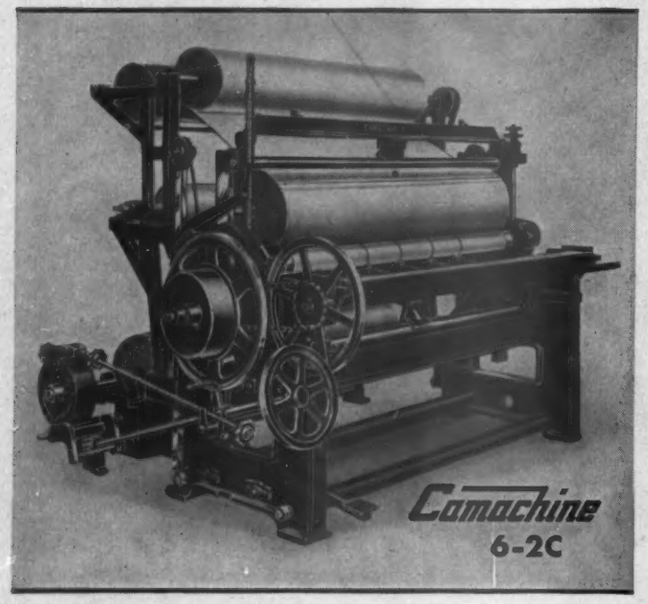
Joseph A. Faucher, formerly associated with the U. S. Rubber Co., died of a heart ailment on March 12 at the Veterans Hospital, Bronx, New York. He was 53 years old. A native of Tacoma, Wash., and a graduate of the University of Detroit, Mr. Faucher joined U. S. Rubber in 1925 in the technical service department at Detroit. He was made manager of airplane tire sales in 1929, and from 1941 to 1945 was with the company's War Products Division. Mr. Faucher has served in World War I as an officer in the Air Corps. Funeral services were held on March 16 in the chapel of the Veterans Hospital with interment in Arlington National Cemetery, Fort Meyer, Va., March 17. His wife, a son and a daughter survive.

Edward A. Sheehan

Edward A. Sheehan, president of the General Fibre Co., Inc., Walpole, Mass., died on January 21 at the age of 67. He had been ailing for the previous year and a half. Mr. Sheehan was previously associated with the Panther-Panco Rubber Co., Inc., Chelsea, Mass., as chief engineer.

Camachines

wherever rubber or plastics are processed in ROLL form



CAMACHINE engineers have perfected specialized slitters and roll-winders to meet requirements wherever rubber or plastics are made, shipped, processed or used in roll form.

A typical example is Camachine 6-2C, widely used by makers of tires, belting, hose, proofed goods and sheet plastics. Camachine 6-2C handles webs up to 62" wide, producing uniformly rewound rolls up to 24" diameter, and slitting strip as narrow as ½". Like all Camachines, 6-2C is simple in construction, easy and economical to operate.

Camachine specialists will gladly provide counsel regarding the right type of slitting and roll-winding equipment to meet your needs. Write for literature.

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FOR FAST, TOP QUALITY ROLL PRODUCTION
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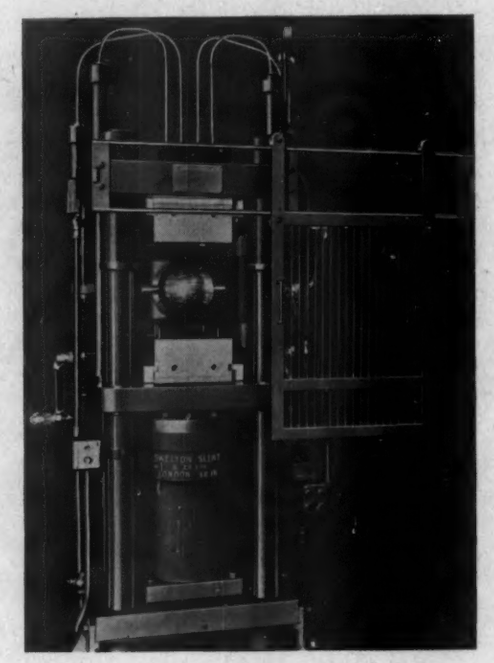
AA-198

NEW EQUIPMENT

Platen Press with Core Actuator

Designed to handle molds which are too heavy for manual operation and which require a heavy core or center piece to be removed to enable rubber articles to be stripped, a new type of platen press has been introduced by Skelton, Sleat & Co., Ltd., South Bermondsey, London, S.E. 16, England. Molds having top and bottom plates which are excessively thick should be drilled and



have steam circulating through for more efficient heating. If the center piece also is bulky, it should be steam heated unless the rubber article being made is very thin, when heating of the core or center piece can be omitted. As loading and stripping can be rapidly accomplished, very little heat is lost while the press is open.

The press illustrated herewith is constructed throughout of steel with the exception of the ram which is of cast iron. The cylinder and gland ring are fitted with bronze bushings as are the table guide holes. The stroke of the table is 12 inches, but since 18-inch daylight is provided the unit can accommodate deep molds. Two push-back rams are provided for quickly lowering the table. Sliding on the two back press columns is a steel bracket with long holes fitted with bronze bushings. Two cylinders with short rams attached to the sides of the press crosshead actuate this bracket in the downwards direction only, the stroke being limited by side rods. Each of the cylinders are of the same diameter and each is fitted with bronze bushings and two ram rings and one spreading ring. The rings can be renewed by releasing the ram attachment for its table or bracket when the gland ring can be taken off.

The press operating valve is the usual three-position lever type so arranged that while pressure is admitted

THE STORY BEHIND THE WORD...

HUNKY-DORY...

Sailors in the mysterious Oriental port of Yokohama in the last century had more than their usual trouble making ship after liberty. The Japanese couldn't understand them and the alleys were a maze of confusion. There was, however, one spot—the intersection of Hung and Dory Streets in the center of town—where the men could get their bearings. Once there, as the sailors put it, "Everything was hunky-dory."

A long record of strength, stability and progressive leadership has made the word Muehlstein—the First Name in Scrap Rubber.

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DC Silicone News

Silicone Insulation Gives 200 Times Class "A" Life in Tread Cutter Motors

Lake Shore Tire and Rubber Specifies Silicone Insulation for Critical Motors

Case histories from all fields of industry prove that Dow Corning Silicone (Class "H") Insulation pays remarkable dividends. The initial cost of rewinding a motor with Silicone Insulation is about twice the cost of a conventional rewind job but Silicone Insulation lasts 10 to 200 times as long. The increase in production that comes of continuous operation is a bonus paid by Dow Corning Silicones.

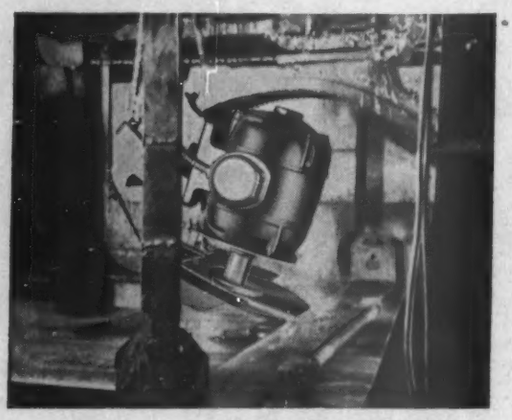

PHOTO COURTESY LAKE SHORE TIRE AND RUBBER CO.

Rapidly reversing tread cutter motors rewound with Dow Corning Silicone Insulation have more than 200 times the life of Class "A" motors.

At Lake Shore Tire and Rubber Company of Des Moines, Iowa, open type 2 h.p. motors are used to drive disc cutters that scarf cut tread stock into lengths. These motors reverse 12 times per minute and operate in a mist of the water used to lubricate the cutters. Life of class "A" motors in this service ranged from 4 days to a few weeks. Production suffered and maintenance costs were abnormally high.

Lake Shore's electrical maintenance engineers had these motors rewound with Silicone Insulation over 2 years ago. They have already given as much as 200 times the service life of Class "A" motors. This proof of Silicone economy convinced Lake Shore engineers that DC Silicone insulated motors should be used in other essential production equipment such as McNeil Vulcanizers and Banner Bias Cutters.

Here, as in any production plant, Dow Corning Silicone Electrical Insulation greatly increases the life and reliability of hard working motors and motors on which production schedules depend. For more case histories write for pamphlet G7V4.

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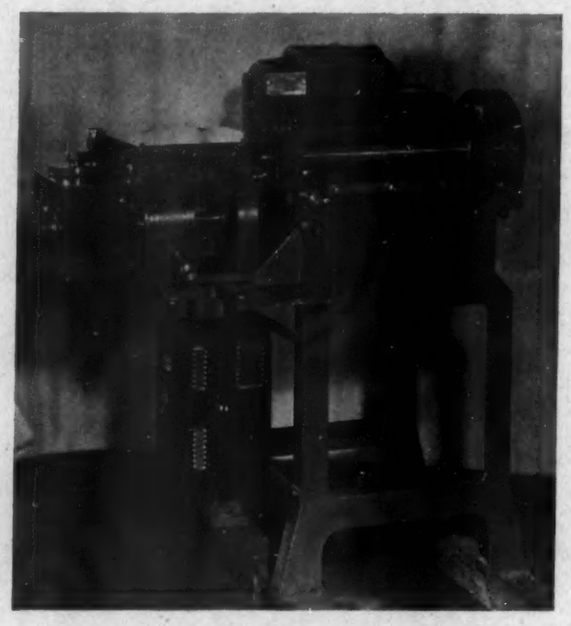
Dow Corning
FIRST IN SILICONES

to the main cylinder the four small cylinders are connected to exhaust and reversed for lowering.

The new Skelton-Sleat presses may be operated in small groups to suit the cycle of operation and the power provided by a high speed pump using oil as the hydraulic fluid and capable of delivering a large volume at low pressure for the ram approach, automatically changing to a small volume at high pressure when resistance is met. The ram approach speed is 8 seconds per foot and the return speed is 4 seconds per foot, depending of course on the pump used, the pressure necessary being 200 and 2240 pounds per square inch which gives a total press load of 70 tons. The table measures 22 inches from back to front and 15 inches between the columns. A 5 h.p. motor is sufficient to drive a pump of the above capacity.

National Rubber Band Cutting Machine

A complete, compact motor-driven rubber band cutting machine, completely ball and roller bearing equipped, has been developed by the National Wire Machinery Co., 821 Washington St., Lynn, Mass. The new cutting unit has a sturdy cast iron frame with space for a belt conveyor under the machine. It features a magnetic contactor with push-button control and a multiple V-belt drive from motor to knife rotor. The knife rotor has three blades, each 13¾ inches long, with screw adjustment. The rotor itself is mounted in heavy-duty ball bearings, in dust-proof housings, fitted with grease lubricators. The speed of the rotor is up to 300 r.p.m. The feed rolls are 1½ inches in diameter and are mounted in roller bearings fitted with grease lubricators. Drive from rotor to feed rolls is through a variable speed planetary friction drive or a 10-speed quick-change gear box. The machine can be arranged to be driven from an overhead counter shaft. Gears can be furnished to cut band widths to customer specification. Adequate steel guards are provided over the knife rotor and the belt and gear drives.



Need faster acceleration?

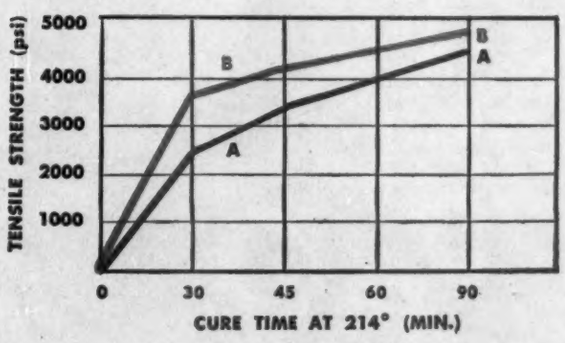
ULTEX*

AN ULTRA ACCELERATOR . . .

When looking for fast acceleration consider Ultex, the multiple use accelerator. Rapid and efficient in natural rubber both as a primary and secondary accelerator. Excellent with reclaims and GR-S with safe processing.

TEST RECIPE

COMPOUND	A	B
SMOKED SHEETS	100.0	100.0
ZINC OXIDE	10.0	10.0
SULPHUR	2.0	2.0
STEARIC ACID	1.0	1.0
ULTEX	0.5	0.75



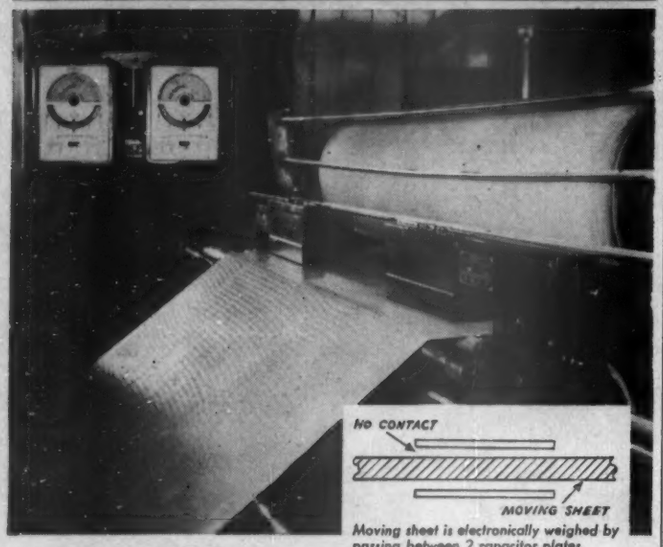
The C. P. Hall Co.
CHEMICAL MANUFACTURERS

*Manufactured by CHEMICO, INC.
THE C. P. HALL CO., Manufacturers Agents

AKRON, OHIO • LOS ANGELES, CALIFORNIA • CHICAGO, ILLINOIS • SAN FRANCISCO, CALIFORNIA

Continuously! Electronically!

WEIGHS SHEET STOCK WITHOUT CONTACT



Moving sheet is electronically weighed by passing between 2 capacitor plates.

This Unique System automatically and continuously weighs calendered sheeted material in process . . . indicates instantly any variation in weight of material passing through measuring heads . . . and records weight in ounces per square yard or other suitable units.

By taking advantage of electronic principles, the Verigraph head measures without contacting material. Errors due to speed, surface irregularities and penetration of contacting-type measuring elements are eliminated.

This Foxboro Verigraph Recording System is used on rubber and plastic sheeting by such leading companies as Goodrich, Goodyear, Firestone, General, U. S. Rubber, and Dow Chemicals. It reduces rejects, improves uniformity, and can save tons of material annually. Write for Bulletin No. 234. The Foxboro Company, 256 Neponset Ave., Foxboro, Mass., U. S. A.

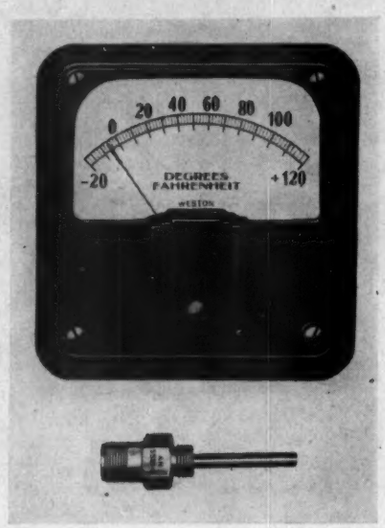
An exclusive Foxboro development, the Verigraph Weight Recorder applies the speed and sensitivity of electronics to weight recording. Simple to install and operate. Used by leading companies on critical calendering since 1926!

FOXBORO
REG. U.S. PAT. OFF.

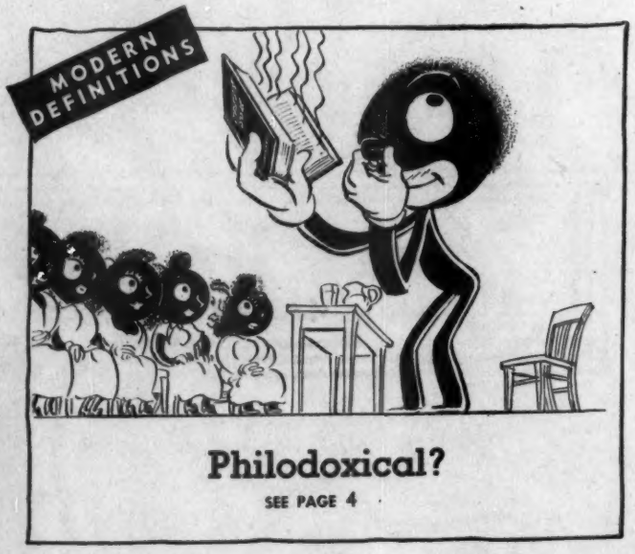
RECORDING
CONTROLLING
INDICATING
INSTRUMENTS

New Weston Electrical Thermometer

An electrical thermometer, designed particularly for the many industrial applications where remote indications are necessary, has been introduced by the Weston Electrical Instrument Corp., 617 Frelinghuysen Avenue, Newark 5, N. J. Known as Model 918, this thermometer employs a sensing element called the resistor bulb which is readily placed in tanks, machines, etc., with the direct indicating instrument mounted any reasonable distance from the bulb. With the incorporation of a selector switch and multiple bulbs, a number of temperature measurements are possible while using but one indicating instrument.



Model 918 is described as a ratio-type instrument with a scale over five inches long, having excellent control and damping, and showing quick response to temperature variations. It is designed for use on 100 to 130 volts, 50 to 60 cycles AC, and is not affected by normal line voltage variation. It can also be supplied for use on DC. The thermometer is already in use for continuous remote indicating of temperature of molds and baths, oil storage tanks and calender rolls in rubber and other plants.



Philodoxical?

SEE PAGE 4

Tough...flexible...decorative...

maybe it can give you ideas!

THE material you see above is braided wire. Here at National-Standard it is produced in almost limitless variations... flat, tubular, plain, beamed, springlike or untempered, tight or expanded, in many wire sizes, in a great many widths, and of any metal that can be drawn into wire.

At present, the most common uses are for reinforcing pneumatic tire beads, high pressure hose and other rubber products. In these applications its strength and mechanical adhesion qualities are unsurpassed.

Considering its limitless variations and unique qualities, braided wire is bound to have many other effective applications. Perhaps it can save or make money for you! An interesting possibility, for example, is its use with transparent plastics to produce pleasing patterns as well as reinforcement.

If all this gives you an idea you'd like to explore, be assured that National-Standard, as usual, is ready to cooperate with you all the way. Let's talk it over. Just get in touch with the *National-Standard Company, Niles, Michigan.*

NS
NATIONAL-STANDARD
Company
NILES, MICHIGAN

DIVISIONS OF NATIONAL-STANDARD CO.

ATHENIA STEEL	*Clifton, N. J.*	Flat, High Carbon, Cold Rolled Spring Steel
NATIONAL-STANDARD	*Niles, Mich.*	Tire Wire, Fabricated Braids and Tape
WAGNER LITHO MACHINERY	*Jersey City, N. J.*	Lithographing and Special Machinery
WORCESTER WIRE WORKS	*Worcester, Mass.*	Round Steel Wire, Small Sizes

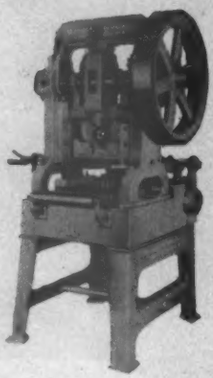
only COULTER can offer you all 4 RUBBER CUTTING MACHINES

1. MODEL A 1—cutting Heels at high speed production or short runs.

2. Model A 2—cutting Multiple Heels, Half and Full Soles with stock grain.

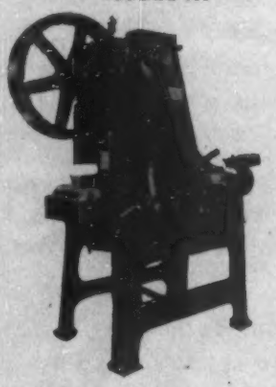
3. Model A 3—cutting Multiple Heels and Taps with or across stock grain.

4. MODEL A2s (Not illustrated) —cutting cross grain of stock.

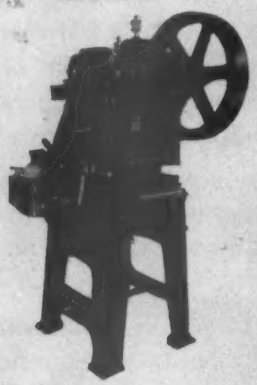


MODEL A2

MODEL A1



MODEL A3



MORE and MORE "UNIFORM QUALITY"

Years of comparisons for wear and service have proven COULTER offers more in higher quality cuttings . . . more in greater production. There is a COULTER MACHINE for cutting volumetric control and stripping of heels, soles, taps and other molded products. Specify a Coulter "Uniform Quality" Machine.

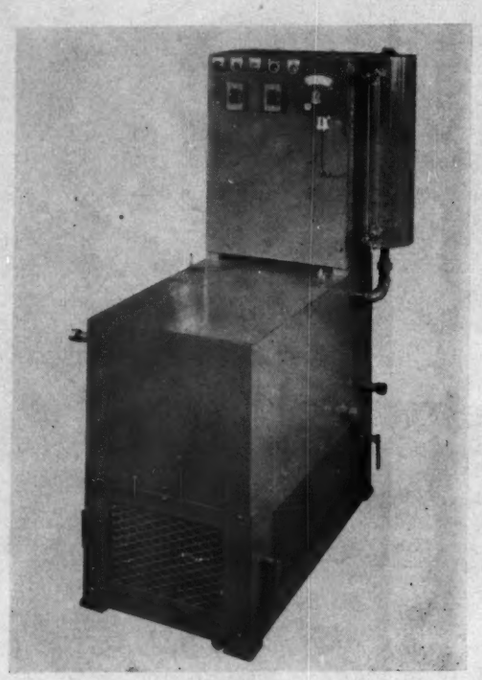
PRODUCTION MACHINES SINCE 1896

The James COULTER Machine Co.

BRIDGEPORT • CONNECTICUT • U.S.A.

Oil Heating and Cooling Unit

Specifically designed for use wherever a constant temperature of 575° F. must be maintained by circulating oil, the NRM 18 KW Oil Heating and Cooling Unit manufactured by the National Rubber Machinery Co., Akron 8, Ohio, has a patented feature which makes it



possible to circulate cold oil by the flip of a switch. When the cold oil is circulated, heaters automatically are shut off and the oil in the reservoir and heating chambers does not circulate. A hot oil reserve for restarting is thus maintained. The total oil capacity of the unit is approximately 14 gallons, with a gear type pump circulating 5 G.P.M. A standard drive motor of ¾ hp., 220-440 volts, 3 phase, 60 cycle is provided. An indicating temperature control maintains the temperature of the oil in the heating chamber with an accuracy of ±2° F.

Three 6 KW immersion heaters are so located that the oil passes over the full area of each thus maintaining the 18 KW capacity. For closer control, auxiliary switches are provided to cut-out one or two of the three heaters after the initial preheating period if the full 18 KW capacity is not required. The unit is piped throughout with steel tubing and standard flared fittings, while the expansion tank is provided with a clearly visible oil level sight glass for safety. The separate cabinet housing the electrical control panel and also supporting the temperature control and switches can be installed in any position to suit application.

The development of a new instrument for **recording time-in-process** has been announced by the Bristol Co., Waterbury, Conn. The instrument gives a reading on a uniform scale and chart of rate of conveyor movement, directly in terms of the total time consumed by work in traveling through a process. It finds application on continuous drying and baking ovens, continuous furnaces for metal annealing, etc.

SIMPLEX
REG. TRADE MARK

RUBBER STRIP CUTTER

PATENTED

A PORTABLE machine capable of stripping slab rubber up to 1" thick at the rate of 20,000 feet in 8 hours. Any width desired.

SPECIAL FEATURES

- Has micro-adjustment for accurate widths.
- Equipped with water tank which feeds water to the slotted knife and to the cut.
- Has repulsion induction motor which carries any overloads.
- Automatic sharpener device keeps knife keen and sharp.
- Has base with rollers and is very easy to handle.

Cuts within 1/64 inch to 1/100 inch tolerance depending on grades of rubber. Cuts a slab down to the last shaving. Cuts all grades of rubber including pure gum, sponge, etc. Cuts squarely—no rejects.

Now in use by many leading Rubber Manufacturers & Jobbers

Simplex Cloth Cutting Machine Co., Inc.

Manufacturers of a Complete Line of Cloth Cutting Machinery

270 West 39th St. New York 18, N. Y.

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THIONEX

a high speed accelerator

by

Du Pont

has these advantages in rubber and GR-S

★ GIVES FAST CURES ★ GOOD AGING

★ SAFE ★ NON-DISCOLORING

★ DELAYED ACTION ★ NON-BLOOMING

★ STABLE IN MASTER BATCHES

DU PONT RUBBER CHEMICALS

E. I. DU PONT DE NEMOURS & CO. (INC.)

WILMINGTON 98, DELAWARE

BETTER THINGS FOR BETTER LIVING ...THROUGH CHEMISTRY

DU PONT REG. U.S. PAT. OFF.

TRIPLE MOLDING UNIT FOR BATHING CAPS

All steel self-contained, pressurized by oil pump.

Line pressure 1 ton per sq. in. 3 daylights of 4⅝".

Platens 22" x 13" steam or electrically heated return rams.

Alignment of table insured by gunmetal liners.

DIMENSIONS

17' long, 1' 10" wide, 7' 4" high.

Weight—5 tons

MOLD MAKERS FOR THE RUBBER INDUSTRY FOR OVER SIXTY YEARS

SKELTON, SLEAT & CO., LTD.

SOUTH BERMONDSEY, LONDON, S.E. 16, ENGLAND. *CABLES:* INADHESIVE, LONDON

High Styrene *DAREX COPOLYMER X-43

This reduction in your costs is the result of your increased demand for Darex Copolymer X-43 and our increased production facilities. Darex Copolymer X-43 —thoroughly tested, proven, and now widely used in shoe soles, flooring, and molded goods. Carload lots available at 36c a pound, f. o. b. our plant, *minimum transportation prepaid.*

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DAREX COPOLYMER X-34

Excellent For Wire Insulation

Darex Copolymer X-34—a specialty type high styrene copolymer . . . superior for resilience and resistance to cutting and abrasion. Darex Copolymer X-43 has excellent dielectric characteristics . . . unusually low water absorption . . . *resists softening in C. V. cures.*

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DAREX COPOLYMER #3

For Mill Mixing

Darex Copolymer #3 eliminates masterbatching of rubbers with high styrene resin. Used extensively for heels and work shoe soles.

*T. M. REG. U. S. PAT. OFF.

A Product of
Dewey and Almy Chemical Company
CAMBRIDGE 40, MASSACHUSETTS

REVIEWS

BOOKS

History of Naugatuck, Connecticut. By Constance McL. Green. Published by the Naugatuck Chamber of Commerce, Naugatuck, Conn. 6¼ x 9¼ in. 332 pp. $5.00.

Because the history of Naugatuck, Connecticut, is so closely associated with the birth and growth of the rubber manufacturing industry in the United States, this book should prove of exceptional interest to all historically-minded members of the rubber field. Originally a farming community, the town gradually turned into a manufacturing area, with rubber among the first of the heavy industries securing a foothold, starting with the manufacture of rubber footwear under the Charles Goodyear patents by Samuel J. Lewis & Co., the forerunner of the Goodyear Metallic Rubber Shoe Co. The book includes an account of the discovery of vulcanization and virtually traces the outstanding developments in the rubber art through the establishment of rubber factories in Naugatuck, one of which was the Seamless Rubber Co. which later moved to New Haven. Although rubber still remains one of the town's major industries, the importance of other industries, including chemicals, cutlery, candy and malleable iron, is emphasized.

BOOKLETS, CATALOGS, etc.

Push Button Compounding. (Standard Method 128). %Proportioners, Inc., 9 Codding Street, Providence 1, R. I. 9 x 11 in. 16 pp.

The automatic addition of ingredients to Banbury Mixers is discussed in this report which outlines the advantages of "push button compounding" in which a motor-driven metering pump controlled by a counter mechanism runs in such a way as to introduce additives at scheduled intervals. Such matters as the combining of dry and liquid ingredients, monitor devices, typical formulas and specifications are outlined. Specifications for one up to four additives for typical job conditions, including equipment specifications and the operation of equipment, are considered. Specifications for more than 10 additives also receive attention as do specifications for multiple liquid and dry ingredients. Flow charts, diagrams and photographs illustrate the report.

•

Elastomer Cements Containing MDI-50. (Report BL-230). Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del. 6 x 9½ in. 8 pp.

Additional information on elastomer cements containing MDI-50 is presented in this report. Several solvent systems having a wide range of evaporation rates are suggested and their effects on cement stability and adhesion are shown. The effect of MDI-50 concentrates on the stability and adhesive properties of a natural rubber cement is also discussed. Data are presented showing the effect on adhesion of storing an MDI-50 cement before treating a fabric. The effect on adhesion of storing fabric after treatment with a freshly prepared treated cement is also shown.

•

Barrett Lift Trucks. (Bulletin 4883). Barrett-Cravens Co., 4613 South Western Blvd., Chicago 9, Ill. 8½x11 in. 28 pp.

Illustrated in two colors, this booklet describes in detail hand lift trucks in capacities from 1,000 to 15,000 pounds. Design drawings and specifications are included, and close-up views illustrate the mechanical features of single stroke hand lift trucks. Of practical help to lift truck users is a chapter on selecting the proper model.

THE CAMBRIDGE

INDUSTRIAL MODEL

DIRECT READING

pH METER

- Operated from any AC outlet
- Completely portable. Weighs only 10 lbs. Electrodes are integral parts of the instrument.
- Accurate to .10 pH.
- Shielded glass electrodes permit use of electrodes at any distance from the instrument.
- May be used on a bench or wall mounted.
- Self contained in one metal case including electrodes and buffer solutions.
- Extremely stable.
- Automatic temperature compensation.

Send for bulletin 910-NA.

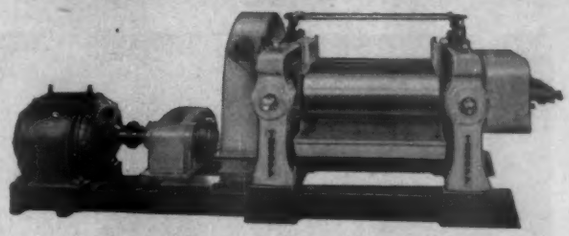
Also available: Electron-Ray Research Model accurate to .02 pH and Laboratory Model accurate to .05 pH and Single- and Multi-point recorders.

CAMBRIDGE INSTRUMENT CO., INC.

3754 GRAND CENTRAL TERMINAL NEW YORK 17, N. Y.

Pioneer Manufacturers of
PRECISION INSTRUMENTS

NEW Design Heavy Duty MILLS



. . . available with roller bearings

A COMPLETE new line of extra heavy duty individual motor driven 42", 50", 60", 72" and 84" mills for the rubber and plastics industry.

New features include reduced floor space; increased horsepower ratings where necessary; built-in herringbone gear speed reducers, mounted on anti-friction bearings; and our new design, internal expanding, shoe-type, hydraulically loaded safety brake—unquestionably the finest safety device available for mills at the present time. Send for specifications.

- *West Coast Rep.:* H. M. Royal, Inc., Los Angeles, Cal.
- *Export Agent:* Steinhardter & Nordlinger, 105 Hudson St., N. Y.

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WM. R. THROPP & SONS CO. Trenton, N. J.

For Dependability *Choose* ROYLE

Continuous Extruding Machines for the Rubber, Plastic and Chemical Industries

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Continuous Vulcanizing Machines for Rubber Wire Insulation

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Plastic Wire Insulation Machines

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Strainers

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Cooling Troughs

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Light Wire and Cable Capstans

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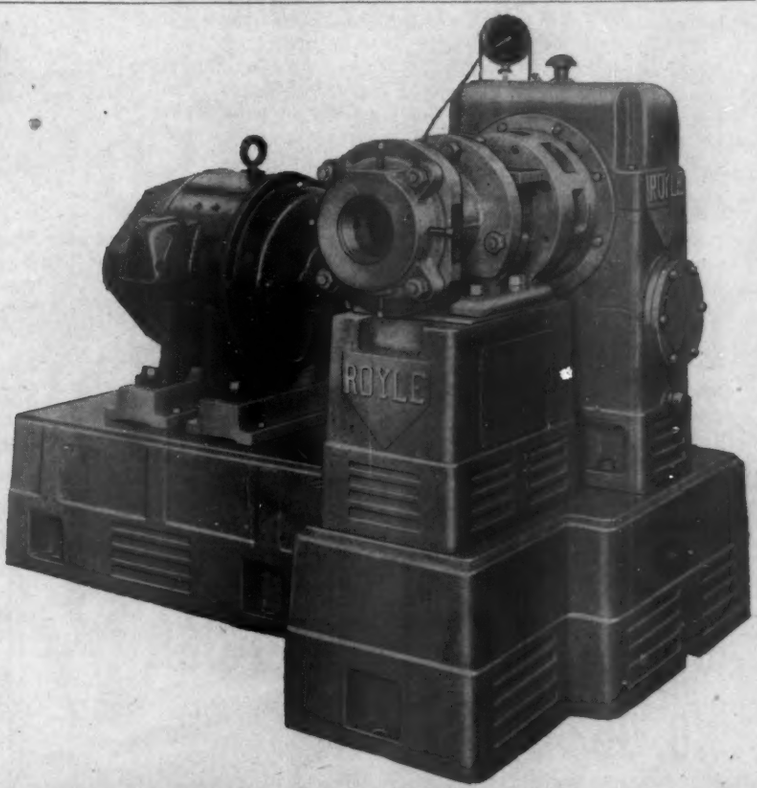
Motorized Take-Ups

•

Temperature Control Units



ROYLE No. 2 Extruding Machine. Non-extended cylinder, plain tubing head, direct coupled drive. This extruding machine is designed for conventional applications in the rubber field.

JOHN ROYLE & SONS ROYLE PATERSON N. J.

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ANNOUNCE DC MOLD RELEASE EMULSION NO. 35A AND NEW PRICE REDUCTION

Hundreds of emulsifying agents are tested in a continuing effort to improve the performance and to decrease the cost of Dow Corning Silicone mold release agents.

DC Mold Release Emulsion No. 35 has proved its effectiveness and its basic economy in the molding of rubber tires and mechanical goods in both large and small plants from Akron to Bombay. But we aren't satisfied to make the best mold release agents on the market. We want to make the best still better—and cheaper.

For example, DC Mold Release Emulsion No. 35 now costs you 20% less than it did three and a half years ago. The present price became effective February 28, 1949, when we announced a cut of 6%, the fifth reduction in price made during a period of general inflation. This history of steadily decreasing prices has been balanced by improvements designed to make our mold release agents even more effective and easier to use.

For example, we have recently introduced DC Mold Release Emulsion No. 35A. This new silicone emulsion is more stable and shows less tendency to "cream" in storage. It is designed especially for use in areas where hard water complicated the use of Emulsion No. 35.

The services of our product development engineers are made available to you through the sales engineers who staff our branch offices. They will be glad to give you the benefit of their wide experience in helping to solve release problems.

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DC MOLD RELEASE EMULSION NO. 35

FOR MORE INFORMATION PHONE OUR NEAREST BRANCH OFFICE OR WRITE FOR CATALOG NO. C12V8

Dow Corning
FIRST IN SILICONES

REVIEWS (CONT'D)

The Handling of Webs and Monofilaments. By C. A. Litzler, Industrial Ovens, Inc., 13825 Triskett Rd., Cleveland 11, Ohio. 8½ x 11 in. 20 pp.

This booklet is a reprint of a paper originally presented before a convention of the American Society of Tool Engineers. It is a liberally illustrated study of some primary considerations with respect to entire handling operations involving flexible and continuous strand or web materials, such as wire, monofilaments, cords, tapes, tubings, paper, textiles and films. The basis of the study is purposefully broad to show the similarity of handling problems encountered in extrusion takeup of wire or cable, for example, as compared with the coating of textiles with plastic for electrical insulation or for decorative coating of paper or fabrics. The booklet treats the complete handling system as a whole rather than in its several component parts. Use is made of diagrammatic drawings and photographs to bring out clearly the principles dealt with and the points developed in the text.

•

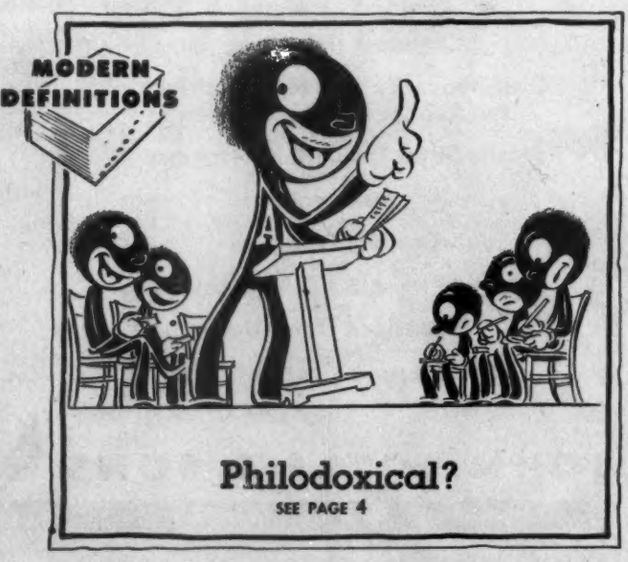
For Effective Neutralization of Industrial Wastes—Micromax Automatic pH Control. (Bulletin ND44-96-708). Leeds & Northrup Co., 4934 Stenton Avenue, Philadelphia 44, Penna. 7½ x 10½ in. 20 pp.

Showing how numerous plants and factories are effectively combating stream pollution through the use of standard pH equipment which automatically controls the neutralization of waste, this bulletin describes a unique "controllability analysis," by which L & N engineers are advising management in advance whether waste pH can be kept within prescribed limits, or what treating system, or modification of existing layout, will be required. The bulletin explains how the equipment continuously regulates the addition of reagent to raw waste so that pH is held within the limits predicted. Described and pictured are two available control systems, Micromax Electric and Micromax Pneumatic Control. How both systems correctly proportion reagent flow to waste demand is also described.

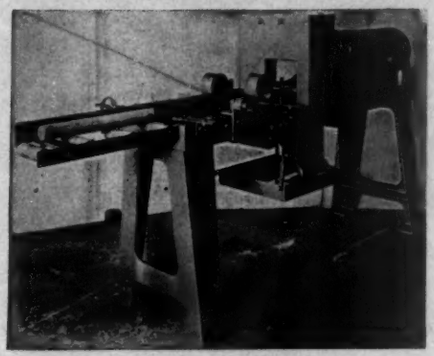
•

How to Use Tite-Fit Burlap Tubing. Bemis Bro. Bag Co., 52nd Street & 2nd Avenue, Brooklyn, N. Y. 6 x 8½ in. 24 pp.

Completely illustrated, this booklet shows how to wrap, for shipment, such unwieldy items as coiled rubber hose, belting, etc. Also explained in some detail are instructions on how to wrap heavy items without lifting, and how to stencil, label, tie and tag different items for shipment.



SLICER MACHINE FOR EXTRUDED STOCKS



With High Speed Disc Cutting Blade, Automatic Feed and with Tandem Feed Wheels. Capacity Section Up to 3" by 4½"—Length ⅛" to 4".

UTILITY MANUFACTURING COMPANY
Cudahy, Wisconsin
Cable Address: UTILITY-MILWAUKEE
Long Distance Phone Call
MILWAUKEE—SHERIDAN 4-7020

Thermoflex A

FLEX CRACKING INHIBITOR
by
DU PONT

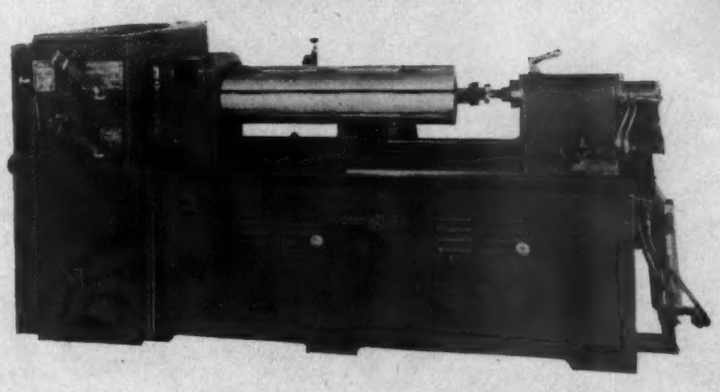
Has Many Advantages in Rubber Compounds:

★ **Economical Protection Against Flex Cracking**
★ **Resistance to Aging**
★ **Heat Resistance**
★ **Readily Dispersed**

DU PONT RUBBER CHEMICALS
E. I. DU PONT DE NEMOURS & CO. (INC.)
WILMINGTON 98, DELAWARE
BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY
DU PONT

THE BLACK ROCK 4A-20

AUTOMATICALLY CUTS
LARGE SIZE WASHERS GASKETS RINGS



Inquire how the BLACK ROCK 4A-20 will solve your washer cutting problem . . . inexpensively, quickly and AUTOMATICALLY.

—handling sleeves made of rubber, synthetics, fabrics, paper, etc., ranging from 9" to 20" O.D., having a maximum wall thickness of 1¾". Cuts from 1/32" to 1" in width may be obtained.

Loading and unloading is facilitated by use of latest type expanding mandrels and air actuated disappearing tailstock. Mandrels are power operated and four sizes cover the range of the machine. All controls are within easy reach.

Write today for full information.

FINE BR TOOLS

BLACK ROCK MFG. CO.
179 Osborne Street Bridgeport 5, Conn.
Pacific Rep. Lombard Smith, Los Angeles, Cal.
N. Y. Office, 261 Broadway

Vulcanized
VEGETABLE OILS
RUBBER SUBSTITUTES
Types, grades and blends for every purpose, wherever Vulcanized Vegetable Oils can be used in production of Rubber Goods—be they Synthetic, Natural, or Reclaimed.
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CARTER BELL PRODUCTS
1903
SPRINGFIELD, NEW JERSEY
Represented by
HARWICK STANDARD CHEMICAL CO.
Akron, Boston, Trenton, Chicago, Denver, Los Angeles

REVIEWS (CONT'D)

Farrel Speed Reducers. (Bulletin 449). Farrel-Birmingham Co., Inc., 344 Vulcan St., Buffalo 7, N. Y. 8½ x 11 in. 44 pp.

This bulletin contains complete information about the company's line of speed reducers which are now offered in a wider range of sizes and capacities. The bulletin gives simple, easy-to-understand directions for selecting speed reducers of the horsepower and speed required, and will be of interest and practical value to engineers responsible for the selection, operation, and maintenance of power transmission units. Contents include complete descriptions of units of the single and double reduction types, specifications, horsepower rating tables, overhung load capacities, dimensions and weights. Among the features of these units which contribute to smooth, efficient, power transmission are precision-generated, Farrel-Sykes continuous tooth herringbone gears; oversized, accurately ground shafts properly mounted in roller bearings, and heavy section cases that hold rotating elements in precise alignment.

•

Falk All-Steel Motoreducer. (Bulletins 3105 and 3100). Falk Corp., Milwaukee 8, Wisc. 8½ x 11 in. 16 pp., 20 pp.

Information on the Falk-Steel Motoreducer is here divided into two sections. Bulletin 3105, the Engineering Section, contains dimensions, rating tables, selection tables, and other data of interest to technicians and engineers. Construction features of the unit are outlined in text and diagrammatic drawings. Section two, Bulletin 3100, presents the unit from the sales viewpoint. The advantages of the units as to load capacity, application and design are outlined. The bulletin is illustrated with photographs and engineering drawings.

•

The Tornado Method. Breuer Electric Mfg. Co., 5100 Ravenswood Avenue, Chicago 40, Ill. 8½ x 11 in. 34 pp.

Covering in detail practically every problem of plant and institution floor care and maintenance, this booklet describes the equipment necessary, and the steps to be followed with both old and new floors of every type and composition, from preparation through sealing and finishing. A valuable stain removal chart is included. Complete information on the many types of brushes, discs, holders and pads available from the company with specific instructions for removing old finishes, bleaching, sanding, sealing, waxing and polishing, is given.

•

Le-Hi Hose Couplings, Hose Clamps, Valves and Manifolds. (Catalog No. 149). Hose Accessories Co., Lehigh Avenue at 17th Street, Philadelphia 32, Penna. 8½ x 11 in. 4 pp.

This condensed catalog illustrates and describes the complete line of Le-Hi hose couplings, hose clamps, air valves and manifolds. The company's universal type quick detachable air hose couplings are discussed as are throttle valves for compressed air service, air hammer hose couplings, special high pressure couplings, long shank couplings for low pressure steam and spray hose and the complete line of Le-Hi hose clamps.

TRI-HOMO
DISPERSER and HOMOGENIZER
High speed mill for grinding pigments, fillers, compounds and emulsions, paints, coatings. Complete with motor.
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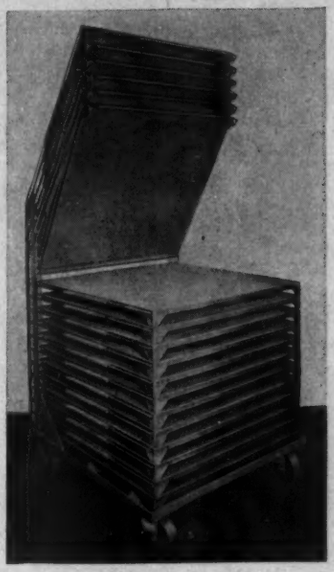
TRI-HOMO CORPORATION
Rear 90 Highland Ave. Salem, Mass.

New Stock Cooling Rack



This new Rack gives unobstructed access to three sides of each tray and offers a convenient method for storing materials that require cooling or air drying. Trays are spring supported and can be quickly raised or lowered, free from all locking devices. Racks having 18 perforated trays 36″ x 36″ or plain surface trays 36″ deep by 4 ft., 6 ft. and 8 ft. long, can be furnished either stationary or mounted on casters.

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For measuring to .0005″ and less, *at-a-glance, anything* —from hardest metal to softest rubber!

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FEATURES: Automatic, uniform contact pressure — everyone gets the same speedy, accurate readings. Weight only 1⅓ ounces. Case thickness ¼″. Dial 1⅝″ dia. Fixed parallel contacts ¼ dia. Direct-reading count hand. Forged aluminum alloy case.

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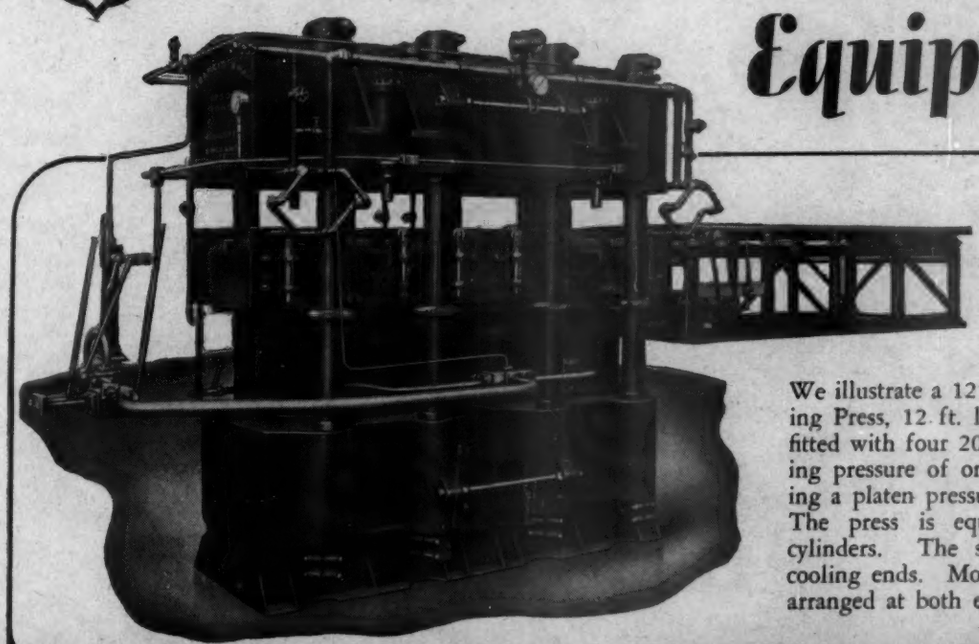
SHAW

Hydraulic Vulcanizing Equipment



We illustrate a 1250 ton single daylight Sheeting Press, 12 ft. long by 3 ft. 6 inches wide, fitted with four 20″ rams, suitable for a working pressure of one ton per square inch, giving a platen pressure of 450 lbs. per sq. inch. The press is equipped with four opening cylinders. The steel steam chests have 9″ cooling ends. Motor driven drawtable can be arranged at both ends of the press if desired.

H 111

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INDUSTRIAL COATINGS

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REVIEWS (CONT'D)

Aluminum Alloy Castings. By Floyd A. Lewis. The Aluminum Association, 420 Lexington Avenue, New York 17, N. Y. 8½ x 11 in. 66 pp. 50c.

The production and application of aluminum alloy sand and permanent-mold castings are covered in this booklet. Originally published as a series of 12 separate articles in *The Foundry* and *Steel*, the material for these articles was obtained in a postwar survey sponsored by the Association's Foundry Division. The various commercial casting alloys and their characteristics are presented. Factors governing the application of aluminum castings in the principal fields of use are also discussed.

•

Baldwin Emery Hydraulic Cells. (Bulletin 288). Baldwin Locomotive Works, Philadelphia 42, Penna. 8½ x 11 in.

Emery hydraulic cells for general industrial weighing and special laboratory testing equipment are described and illustrated in this booklet. Six standard models, ranging in capacity from 10,000 to 100,000 pounds, and special cells having capacities from 40 pounds to 2,500 tons, are described.

•

B & W Refractory Castables, Plastics and Mortars. (Bulletin R-22). Babcock & Wilcox Co., 85 Liberty St., New New York 6, N. Y. 8½ x 11 in. 20 pp.

This comprehensive combined bulletin on a wide range of refractory materials describes the products, outlines their characteristics, and indicates typical applications. Illustrated with many photographs and tables of properties and required quantities, this bulletin will be of help to designers, builders and operators of all types of industrial furnaces.

•

More Horsepower per Dollar With Speedaire. Cleveland Worm & Gear Co., 3249 East Eightieth St., Cleveland 4, O. 8½ x 11 in. 8 pp.

Several case histories on the operation of this worm gear speed reducing unit are presented in this bulletin. Facts and figures on savings realized by users of the unit in the plastics, paper and other industries are itemized. Photographs of the unit in various installations are also presented.

•

The Modern Way to Operate Air Cylinder Presses. (Bulletin 230). Hannifin Corp., 1101 So. Kilbourn Avenue, Chicago 24, Ill. 8½ x 11 in. 4 pp.

This bulletin describes the Directair electric valve recently developed by the company for the control of single or double acting air cylinders, air operated presses, and similar equipment. The operating cycle of the valve is described, and detailed specifications and dimensional data are provided.

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SEE PAGE 4
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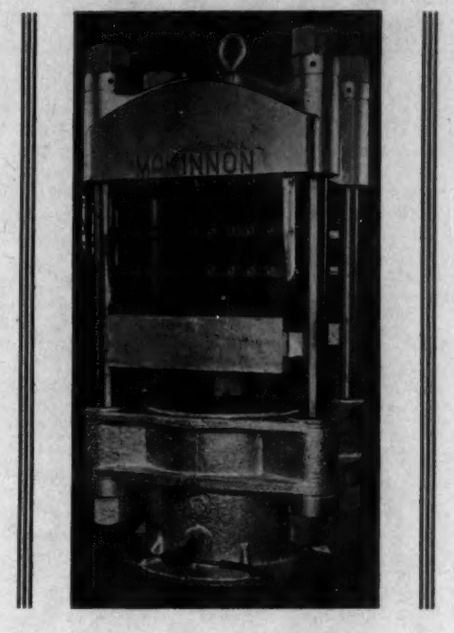
STANDARD OR SPECIAL BUILT
HYDRAULIC PRESSES



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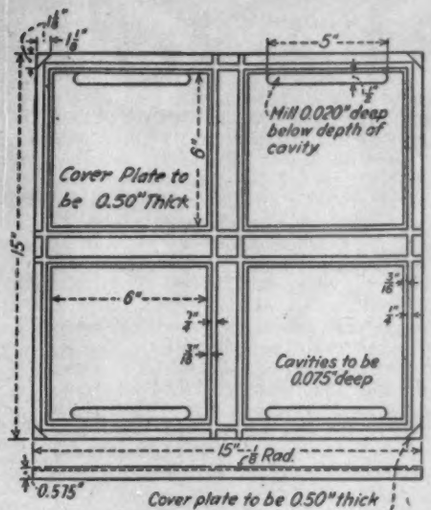

Molds from 7" to 24" sq. for tension samples, and molds for compression samples if desired. Molds in dimensions varying from 1" x 1" x 1¼" up for abrasion test samples. Molds and dies for slab curing. Please describe your need.

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3. Improves processing and molding
4. Improves the following:
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   - Chemical Resistance
   - Toughness
   - Abrasion
   - Heat Resistance
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MARKETS

Rubber – Crude, Reclaimed and Scrap – Cotton – Ducks – Tire Fabrics – Sheetings

NEW YORK, APRIL 7, 1949

Natural Rubber

The price for spot rubber on the Commodity Exchange has swung in the full range of one cent since our last report (March 9), high for the current period being 19.50 first reached on March 16 and then again on March 18 and 21, and low being 18.50, quoted yesterday (March 6). The average price of spot rubber for the month of March was 19.08, based on 23 trading days, which compares with 18.49 for the month of February.

Prices moved upward in mid-March until about the 20th of the month when a declining trend set in, this trend still being in evidence toward the close of the period. Some hesitancy on the part of buyers was noted, and this was attributed in large measure to await the results of the sixth meeting of the International Rubber Study Group, which was to be held in London the week of March 28. The meeting was held, as reported elsewhere in this issue, but, as usual, produced no tangible results other than estimates of world production and consumption of natural rubber for 1949.

Little attention is being paid in trade circles to revived talk of an international rubber regulation agreement and it is felt that the price situation for the next several months to come will hinge on the supply-and-demand situation. In the long run, the price will be dependent on the increase in natural rubber production, particularly in Indonesia, which, based on current consumption estimates, can be absorbed only in government stockpiles. Authorities are in agreement that stockpile activities will bear close watching for the next few months.

Today's quotations in the outside market, London and Singapore follow:

Outside Market

No. 1 Ribbed Smoked Sheets:	
Spot	.18¼
May	.18⅛
June	.18⅛
Thin Latex Crepe:	
Spot	.24⅞
May	.24¾
Thin Brown Crepe, No. 2	.15⅜
Ambers, No. 3	.15⅜
Flat Bark Crepe	.12¼

London Market

(Standard Smoked Sheets)

May	18.53 - 18.63
July-September	18.03 - 18.24

Singapore Market

(Standard Smoked Sheets)

May	16.95 - 17.05

Synthetic Rubber

(Dry Types-Per Pound)

Butaprene NF	.390 - .415
Butaprene NL	.400 - .425
Butaprene NAA	.440 - .465
Butaprene NXM	.470 - .495
Chemigum 30 N4NS	.400 - .470
Chemigum 50N4NS	.400 - .470
Chemigum N3	.450 - .520
Hycar OR-25	.450 - .460
Hycar OR-15	.520 - .530
Hycar OS-10	.500 - .510
Neoprene Type E	—— - .650
Neoprene Types CG and AC	—— - .500
Neoprene Types FR and KNR	—— - .750
Neoprene Type S	—— - .320
Paracril 18	.430 - .450
Paracril 26	.440 - .460
Paracril 35	.510 - .530
Silastic (compounded)	2.35 - 4.40
Thiokol Type A	.370 - .470
Thiokol Type ST	.750 - .850
Thiokol Type FA	.520 - .620
Thiokol PR-1	.750 - .850

Scrap Rubber

The scrap rubber market took a slight upward turn during recent weeks but the increases were not of an appreciable nature. Export conditions, long a sore spot in the general scrap picture, have shown some slight improvement. As is the case with the domestic market, export gains have not been substantial. The price structure remains substantially the same. Current quotations follow:

(Prices to Consumers, Delivered Akron)

Mixed passenger tires	ton	$13.00
Beadless truck tires	ton	nom.
Mixed truck tires	ton	13.00
Beadless passenger tires	ton	nom.
No. 1 passenger peelings	ton	42.50
No. 1 truck peelings	ton	42.50
Red passenger tubes	lb.	.06¼
Black passenger tubes	lb.	.03½
Mixed passenger tubes	lb.	.03¾
No. 2 truck tubes	lb.	nom.
Red truck tubes	lb.	.06
Black truck tubes	lb.	.03
Buffings	ton	15.00

Reclaimed Rubber

The demand for reclaim is still satisfactory, but has fallen from the high levels of recent months. Consumption of reclaim for the month of February was estimated at 17,636 long tons, as compared with 19,031 tons in January. A further decline is anticipated for the month of March. No changes have occurred in the price structure since our last report. Current quotations follow:

Tires

Black, Acid	lb.	.09 - .09½
Black, Digester	lb.	.08½ - .09
Peels	lb.	.09 - .09½
GR-S Whole Tire	lb.	.08½ - .09

Inner Tubes

Black	lb.	.12¾ - .13¼
Red	lb.	.13 - .14
GR-S	lb.	.10¼ - .10¾
Butyl	lb.	.08½ - .09

Shoe

Unwashed	lb.	.08¼ - .08¾

Cotton Tire Fabrics

The market for cotton tire fabrics maintains the low level evidenced during the past few months. As has been the case in other fields, export demand has been slowed considerably due to foreign monetary exchange difficulties. Purchase of chafers by the rubber industry continued at a minimum level. Prices in existence for the past few months are expected to hold in the foreseeable future. Current quotations follow:

Standard, Peeler, 12/4/2	lb.	.74
Standard, Peeler, 14/4/2	lb.	.76
Standard, Peeler, 16/4/3	lb.	.7850
Extra Staple, Peeler, 12/4/2	lb.	.8315
Extra Staple, Peeler, 14/4/2	lb.	.8575
Extra Staple, Peeler, 16/4/3	lb.	.8825

Chafers

14.4 oz. (per sq. yard)	lb.	.7400
9.25 oz. (per sq. yard)	lb.	.6975
11.65 oz. (per sq. yard)	lb.	.6700
8.9 oz. (per sq. yard)	lb.	.7125

Cotton

The price of middling uplands on the Cotton Exchange has swung in the very narrow range of 32 points since our last report, high for the period being 33.67 reached yesterday (April 6) and low 33.35 on March 16. The average price of middling uplands for the month of March was 33.44, based on 27 trading days, which compares with an average of 33.41 for the preceding month.

The cotton trade is closely watching Washington activities these days. It is especially wary of a new farm program prepared by the Department of Agriculture which scraps the present "parity price" approach to agricultural price support payments. This parity formula has been the backbone of farm legislation for almost 15 years.

Although little information has been published as yet on the new program proposed by the Department of Agriculture, it is believed that government payments on several key commodities, presumably including cotton, would not be much below the high wartime levels which currently prevail. According to Agriculture Secretary Charles Brannan, the new support system proposed would come closer to providing actual "parity of income" to the farmer than has been accomplished in the past. At this writing (April 7), Secretary Brannan was planning to present the new program before a joint session of the Senate and House Agriculture Committee.

Quotations for middling uplands on the Exchange follow:

	Mar. 9	April		
	Close	High	Low	Close
May	32.22	32.37	32.26	32.32
October	....	28.95	28.72	28.92
December	27.97	28.66	28.43	28.62

Closing Rubber Prices on New York Commodity Exchange

(No. 1 R.S.S. Contract)

FROM MARCH 10 TO APRIL 7

Date March	Spot	May	July	Sept.	Dec.	Sales
10	19.00	18.70	18.50	18.30	18.20	48
11	19.12	18.94	18.70	18.54	18.35	7
12	....	....	....	....	....	...
13	....	....	....	....	....	...
14	19.12	18.96	18.73	18.55	18.35	57
15	19.12	19.00	18.75	18.60	18.40	65
16	19.50	19.42	19.20	19.00	18.75	145
17	19.38	19.20	18.95	18.80	18.60	78
18	19.50	19.53	19.30	19.00	18.85	115
19	....	....	....	....	....	...
20	....	....	....	....	....	...
21	19.50	19.50	19.18	19.00	18.75	41
22	19.25	19.20	19.05	18.75	18.50	20
23	19.12	19.15	18.90	18.65	18.40	21
24	19.06	19.10	18.84	18.63	18.40	27
25	18.82	18.70	18.50	18.33	18.10	61
26	....	....	....	....	....	...
27	....	....	....	....	....	...
28	18.82	18.84	18.64	18.40	18.15	19
29	19.12	19.14	18.90	18.68	18.45	24
30	19.12	19.16	18.90	18.70	18.47	115
31	19.00	18.77	18.53	18.30	18.15	11
April						
1	18.88	18.87	18.60	18.40	18.15	100
2	....	....	....	....	....	...
3	....	....	....	....	....	...
4	18.75	18.71	18.47	18.26	18.10	32
5	18.62	18.55	18.33	18.15	18.00	229
6	18.50	18.40	18.15	18.00	17.85	72
7	18.75	18.68	18.40	18.25	18.05	38

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CURRENT MARKET PRICES

Of Rubber Chemicals and Compounding Ingredients

APRIL 6, 1949

Prices are, in general, f.o.b. works. Range of prices indicates grade or quantity variations.

Abbreviations: bbls., barrels; c.l., carlot; cyl., cylinder; dlvd., delivered; dms., drums; l.c.l., less than carlot; M.B., masterbatch; min., minimum; ref., refined; sap., saponified; sp., special; syn., synthetic; t.c., tank cars.

[a] East of Mississippi.

—The arrangement of this section follows closely the Chemical Section of the 1947 RUBBER RED BOOK to which readers are referred to determine the classification of any material or brand name.

—Although suppliers of every material were contacted for price information, only those materials are listed for which quotations have been furnished us. The quotations are not guaranteed and prospective purchasers should contact suppliers for confirmation before placing orders. Suppliers are requested to send us regularly current prices on all of their materials used in the rubber industry.

—All requests for information or listings should be sent to Market Editor, RUBBER AGE, 250 West 57th St., New York 19, N. Y.

ACCELERATORS

A-1	lb.	.34	.39
A-10	lb.	.40	.47
A-19	lb.	.52	.58
A-32	lb.	.59	.69
A-77	lb.	.42	.55
A-100	lb.	.42	.55
Accelerator No. 8	lb.	—	.83
Accelerator—49	lb.	.44	.45
Accelerator—89	lb.	—	1.20
Accelerator—122	lb.	—	1.30
Accelerator—552	lb.	—	1.80
Accelerator—808	lb.	.59	.61
Accelerator—833	lb.	1.13	1.15
Acrin	lb.	—	.75
Acro AC-165	lb.	.37	.39
Altax	lb.	.35	.37
Arazate	lb.	—	2.16
Beutene	lb.	.59	.61
Bismate	lb.	—	3.00
B-J-F	lb.	.27	.29
Butasan	lb.	—	1.00
Butazate	lb.	—	1.00
Butyl Eight	lb.	1.00	1.25
Captax	lb.	.27	.29
C-P-B	lb.	—	1.95
Cumate	lb.	—	1.45
Cuprax	lb.	.60	.62
Dibenzo G-M-F	lb.	—	2.65
Diorthotolyguanidine	lb.	.48	.50
Diphenylguanidine	lb.	.39	.40
El-Sixty	lb.	.39	.46
Ethasan	lb.	—	1.00
Ethazate	lb.	—	1.00
Ethyl Thiurad	lb.	—	1.00
Ethyl Tuex	lb.	—	1.00
Formaniline	lb.	—	.40
G-M-F	lb.	—	2.50
Good-rite Erie	lb.	.32	.34
Guantal	lb.	.47	.54
Hepteen	lb.	.42	.44
Base	lb.	1.80	1.85
Ledate	lb.	—	1.00
Mercaptobenzothiazole	lb.	.27	.29
Mercaptobenzothiazyl Disulfide	lb.	.35	.37
Methasan	lb.	—	1.00
Methazate	lb.	—	1.00
Monex	lb.	—	1.10
Mono Thiurad	lb.	—	1.10
Morfex	lb.	.53	.55
2-MT	lb.	.53	.55
Novac	lb.	—	1.40
A-13	lb.	.65	.67
O-X-A-F	lb.	.34	.36
Pentex	lb.	.74	.77
Flour	lb.	.12¾	.12¾
Phenex (tons)	lb.	—	.40
Piperate	lb.	—	1.53
Pip-Pip	lb.	—	1.80
R-2 Crystals	lb.	—	1.75
RN-7 (dms.)	lb.	—	1.65
Rotax	lb.	.39	.41
SA 52	lb.	—	1.10
SA 57	lb.	—	1.00
SA 62	lb.	—	1.00
SA 66	lb.	—	1.45
SA 67	lb.	—	1.00
SA 77	lb.	—	1.00
Safex	lb.	—	1.15
Santocure	lb.	.55	.62
Selarate	lb.	—	1.45
Selenac (Ethyl, Methyl)	lb.	—	1.45
Setsit-5	lb.	.75	1.00
SPDX-GH (tons)	lb.	.64	.69
Tellurac	lb.	—	1.45
Tepidone	lb.	—	.55
Tetrone	lb.	—	1.25
A	lb.	—	1.85
Thiocarbanilide	lb.	—	.40
Thiofide	lb.	.35	.42
Thionex	lb.	—	1.10
Thiotax	lb.	.27	.34
Thiurad	lb.	—	1.10
Thiuram E	lb.	—	1.00
M	lb.	—	1.10
Trimene	lb.	.54	.56
Base	lb.	1.03	1.06
Triphenylguanidine	lb.	—	.83
Tuads, Ethyl	lb.	—	1.00
Tuads, Methyl	lb.	—	1.10
Tuex	lb.	—	1.10
Ultex (tons)	lb.	—	1.00
Unads	lb.	—	1.10
Ureka	lb.	.55	.62
Blend B	lb.	.55	.62
C	lb.	.52	.59
Vitasan Crystals	lb.	.48	.53
Vulcanex	lb.	—	.45
Z-B-X	lb.	—	2.45
Zenite	lb.	.33	.35
A	lb.	.42	.44
B	lb.	.39	.41
Zenite Special	lb.	.34	.36
Zetax (coated)	lb.	.33	.35
(uncoated)	lb.	.34	.36
Zimate, Butyl	lb.	—	1.00
Zimate, Ethyl	lb.	—	1.00
Zimate, Methyl	lb.	—	1.00

ACTIVATORS

Blue Lead, Sublimed (dlvd.)	lb.	.15¾	.16¾
Fish Oil, Hydrogenated, Fatty Acid			
Hydrofol Acid (dlvd.)	lb.	.11½	.15
Hyfac 430 (dlvd.)	lb.	.16½	.17½
Neo-Fat H.F.O. (dlvd.)	lb.	.20	.21
Stearex Beads (dlvd.)	lb.	.28	.29½
Lime, Hydrated			
Arrowhead	ton	19.50	20.65
Sierra	ton	19.50	20.65
Litharge			
Eagle (dlvd.)	lb.	—	.17¾
FBS (dlvd.)	lb.	—	.17¾
Magnesium Oxide, Heavy			
General Magnesite	lb.	.05½	.08
Michigan No. 15	lb.	.0550	.0600
Permanente	lb.	.05	.06½
Magnesium Oxide, Light			
Baker's (Neoprene Grade)	lb.	—	.28
General Magnesite (Neoprene Grade)	lb.	—	.31
General Magnesite No. 101	lb.	—	.19
General Magnesite Standard	lb.	—	.22
K & M (Neoprene Grade)	lb.	—	.31
Maglite "M" (l.c.l.)	lb.	—	.31
Marine's (Neoprene Grade (l.c.l.)	lb.	—	.31
Michigan No. 30	lb.	—	.24
No. 40 Extra Light	lb.	—	.31
Witco Extra Light	lb.	.25	.27

ACTIVATORS (Cont'd)

Oleic Acid			
Emersol 210 (dlvd.)	lb.	.11¼	.13
L.C.P. Red Oil	lb.	.25½	.27¼
Red Oil (20-24 Saponified) (dlvd.)	lb.	.09¼	.11
Palm Oil Fatty Acid (c.l.)	lb.	—	.11
Potassium Oleate (drums)	lb.	—	.29½
Red Lead			
Eagle	lb.	—	.18¾
No. 2 RM (dlvd.)	lb.	—	.18¾
Sodium Laurate (drums)	lb.	—	.19
Sodium Oleate—Powder (drums)	lb.	—	.35
Paste (drums)	lb.	—	.20
Sodium Stearate—Powder (drums)	lb.	—	.35
USP Grade (drums)	lb.	—	.37
Stearic Acid, Single Pressed			
Emersol 110 (dlvd.)	lb.	.14	.14½
Stearex B (dlvd.)	lb.	.22	.23
Stearic Acid, Double Pressed			
Alba (dlvd.)	lb.	.24¾	.25¾
S-2-A (dlvd.)	lb.	.22½	.23½
S-2-B (dlvd.)	lb.	.22	.23
Stearic Acid, Other			
Neo-Fat 1-60 (dlvd.)	lb.	.19½	.20½
Neo-Fat 1-65 (dlvd.)	lb.	.22	.23
Stearite	cwt.	36.00	38.00
White Lead Basic Carbonate	lb.	.17	.18
White Lead Basic Sulfate	lb.	.20¼	.21¼
Zinc Laurate (c.l.)	lb.	—	.29
Laurex	lb.	.28	.29
Zinc Stearate	lb.	.40	.43
Aquazinc	lb.	.28	.35

Unclassified Activators

Actifat (dms.)	lb.	—	.18
Acidex	lb.	.09	.15
Aero Ac 50	lb.	.50	.56
165	lb.	.37	.39
Barak	lb.	—	.60
D-B-A	lb.	—	1.95
Delac J	lb.	.55	.57
Dibutylamine (dlvd.)	lb.	.49	.52½
Dutch Boy Normasal	lb.	—	.44¼
NA-11	lb.	—	.65
Palmalene (drums)	lb.	—	.15
Polyac	lb.	—	1.40
Ridacto (drums)	lb.	.22	.24
Snodotte (dlvd.)	lb.	.14½	.15½
SOAC (min. 10 dms.)	cwt.	—	10.00
SOAC-KL (min. 10 dms.)	cwt.	—	10.00

ANTI-COAGULANTS

Anhydrous Ammonia (l.c.l.)	lb.	.17	.21
National (cyl., dlvd.)	lb.	.16	.20
Aqua Ammonia (l.c.l., dms.)	lb.	.0285	.0325
M.B.M. (l.c.l.)	lb.	—	.35

ANTI-FOAMING AGENTS

Aero Anti Foam H	lb.	—	.12
Regular	lb.	—	.08½
D.C. Antifoam A	lb.	6.68	7.30

ANTI-OXIDANTS

Agerite Alba	lb.	2.20	2.30
Gel	lb.	.58	.60
Hipar	lb.	.82	.84
H. P.	lb.	.61	.63
Powder	lb.	.46	.48
Resin	lb.	.63	.65
Resin D	lb.	.46	.48
Stalite	lb.	.46	.48
White	lb.	1.40	1.50
Akroflex C	lb.	.61	.63
Aminox	lb.	.46	.48
Antox	lb.	.54	.56
Aranox	lb.	—	2.80
Benzoquinone	lb.	1.50	1.75
Betanox Special	lb.	.68	.70
B-L-E	lb.	.45	.48
Carvacrol	lb.	—	.85
Chlorcarvacrol	lb.	—	2.45
Eugenol C-95%	lb.	—	1.28
Flectol H	lb.	.46	.53
Flexamine	lb.	.61	.63
Gallic Acid, Tech.	lb.	1.10	1.23
USP or NF	lb.	1.27	1.40
Hydroquinone	lb.	.90	.90
Monomethylparaminophenol Sulfate	lb.	2.40	2.90
Neozone Standard	lb.	.66	.68
A	lb.	.48	.50
C	lb.	.52	.54
D	lb.	.46	.48
DL	lb.	.48	.50

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ANTI-OXIDANTS (Cont'd)

Oxidex	lb.	——	3.40
Parazone	lb.	——	.75
PDA-10	lb.	.36	.38
PDA-20	lb.	.36	.38
Perflectol	lb.	.61	.68
Permalux	lb.	——	1.65
Pyrogallic Acid, Resublimed	lb.	2.60	2.65
USP Crystals	lb.	2.10	2.15
Resorcin, Tech. (dlvd.)	lb.	——	.64
Santoflex B	lb.	.46	.53
BX	lb.	.57	.64
Santovar-A	lb.	1.30	1.37
Santowhite (crystals)	lb.	1.65	1.72
Santowhite MK	lb.	1.40	1.52
MKS	lb.	1.25	1.37
S.C.R. (tons)	lb.	.32	.34
Solux	lb.	——	2.15
Stabilite (tons)	lb.	——	.46
Alba (tons)	lb.	——	.69
L (tons)	lb.	——	.48
Stabilizer No. 1	lb.	——	1.65
Stabilizer No. 320	lb.	——	.80
Tannic Acid, Tech.	lb.	.70	.79
Thermoflex A	lb.	.82	.84
Thymol	lb.	——	2.50
V-G-B	lb.	.55	.57

ANTI-SCORCHING AGENTS

Armeen HT	lb.	.46	.54
Benzoic Acid—Tech.	lb.	——	.43
Good-rite Vultrol	lb.	.55	.57
Retarder PD	lb.	——	.36
Retarder W	lb.	——	.43
Sodium Acetate 60-62% Crystals	lb.	——	.06

ANTISEPTICS AND GERMICIDES

Arquad S	lb.	.24	.27
Formaldehyde (barrels)	lb.	——	.062
G-4 (bbls.)	lb.	.95	2.75
G-11	lb.	3.50	5.50
Methyl Para Hydroxy Benzoate	lb.	——	2.10
Nuodex 100 S.S. (dlvd.)	lb.	——	1.05
Nuodex 100 W.B. (dlvd.)	lb.	——	1.20
Nuodex Zinc 8% (dms.) (dlvd.)	lb.	——	.2125
Ortho Cresol (26°-27°)	lb.	——	.18
Retarder D	lb.	.68	.76
Solgen Drier—Copper 8% (drums)	lb.	——	.22½
Zinc 8% (dms.)	lb.	——	.21¼
Vancide	lb.	——	.80

AROMATICS (DEODORANTS)

Bouquet 149	lb.	——	3.00
Coumarin	lb.	——	2.75
Curodex 19	lb.	——	4.75
188	lb.	——	5.75
198	lb.	——	6.75
D-6 Masking Perfume	lb.	——	1.35
Deodorant 65	lb.	——	1.00
Deodorant L-37	lb.	2.00	2.40
L-44	lb.	2.50	2.90
N.L.T.X.	lb.	1.85	2.15
General Deodorant 18301	lb.	——	2.40
Latex Perfume 5	lb.	——	3.25
6	lb.	——	7.50
9	lb.	——	.65
Naugaromes (dms.)	lb.	1.50	3.00
Neutroleum Delta	lb.	——	2.40
Gamma	lb.	——	3.40
Parador A	lb.	1.75	2.25
B	lb.	.70	1.00
C	lb.	2.75	3.25
D	lb.	1.50	2.00
E	lb.	.25	.55
F	lb.	——	.47
I	lb.	——	2.00
K	lb.	——	.43
GD 5280	lb.	——	2.50
GD 5348	lb.	1.90	3.25
Perfume Oil Bouquet Vanilla M	lb.	2.40	2.75
Rodo No. 0	lb.	4.00	4.50
No. 10	lb.	5.00	5.50
Rubbarome (dms.)	lb.	1.05	3.80
Rubber Perfume 12	lb.	——	1.90
Russian Leather 7	lb.	——	4.10
Vanillin	lb.	3.00	3.15

BLOWING AGENTS

Ammonium Bicarbonate (dlvd.)	lb.	.0725	.1075
Blowing Agent CP-975	lb.	——	.35
Sodium Bicarbonate, U.S.P. (c.l., bags)	cwt.	——	1.85
Sponge Paste	lb.	——	.20
Unicel	lb.	——	.60
ND	lb.	——	1.50
S	lb.	——	.25
Urea	lb.	.0425	.0475

BONDING AGENTS

Durez 12987	lb.	.48	.53
Interlake Resin No. 4162	lb.	——	1.50
MDI	lb.	7.00	7.75
50	lb.	3.50	4.00
Pliobond 20	gal.	2.75	4.00
30	gal.	3.45	4.70
Reanite	gal.	6.75	7.25
Rex Compounds	gal.	1.30	2.85
Ty-Ply Q (and S)	gal.	6.75	8.00

COAGULANTS

Acetic Acid—56% (bbls.)	cwt.	8.11	8.61
Glacial—99½% (bbls.)	cwt.	14.05	14.55
Calcium Nitrate, Tech., Crystals	lb.	.12½	.15
Hydroxyacetic Acid—70% (dms.)	lb.	——	.084
Zinc Nitrate, Tech.	lb.	——	.21½

COLORING AGENTS

Black

Carbon Black—See *Reinforcing Agents*			
Aquablak B (also M, R)	lb.	.0775	.0875
Aquablak S	lb.	.08½	.09
Black Shield 4-35 (dms.)	lb.	——	.0825
Lampblack No. 10	lb.	.06	.09
Mapico Black Iron Oxide (50 lb. bags)	lb.	.1075	.1100
Raven Black Pure Iron Oxide	cwt.	10.75	11.00

Blue

Blue GD, Dispersed	lb.	——	3.95
Paste	lb.	——	1.80
Blue YD, Dispersed	lb.	——	2.50
Milori Blue 11840 (dlvd.)	lb.	——	.45
Monastral Fast Blue CPL	lb.	——	1.54
PCD, Dispersed	lb.	——	2.50
PCD Paste	lb.	——	.75
Ramapo Blue	lb.	3.40	3.45
Rubber Blue X-1999	lb.	——	1.00
Stan-Tone Blue	lb.	1.40	4.00
Ultramarine	lb.	.14	.30
Vansul Blue M.B.	lb.	1.00	2.30
Victoria Blue BP-262-D	lb.	2.25	2.30

Brown

Brown Iron Oxide	lb.	.1075	.12
Mapico Brown (50 lb. bags)	lb.	——	.1250

Green

Filo Green D-700 (and D-705)	lb.	——	.30
Green Chromium Oxide, Pure	cwt.	33.00	40.00
Green Chromium Oxide, Pure, Hydrated	cwt.	75.00	100.00
Green FD, Dispersed	lb.	——	1.50
Monastral Fast Green GSD, Dispersed	lb.	——	3.20
GSD Paste	lb.	——	1.10
GSL	lb.	——	1.71
Permansa Green CP-594	lb.	——	1.35
Pigment Green B	lb.	——	1.35
GL-652D	lb.	.88	.93
Ramapo Green	lb.	——	4.00
Rubber Green X-1292	lb.	——	1.00
Stan-Tone Green	lb.	1.50	3.30
Utility Green	lb.	——	.30
Vansul Green M.B.	lb.	.85	2.25

Maroon

Stan-Tone Maroon	lb.	3.00	3.05
Vansul Maroon M.B.	lb.	1.05	2.65

Orange

Molybdate Orange	lb.	——	.445
Orange FD, Dispersed	lb.	——	2.75
Rubber Orange X-2065	lb.	——	2.60
Stan-Tone Orange	lb.	1.65	2.25
Vansul Orange M.B.	lb.	2.00	2.75

Red

Antimony Trisulfide	lb.	.55	.68
R. M. P. Sulfur Free	lb.	.63	.68
R. M. P. No. 3	lb.	.53	.60
Cadmium Red	lb.	.95	1.25
Cadmolith Red (bbls.)	lb.	1.20	1.45
Graphic Red (dlvd.)	lb.	——	.80
Indian Red, Pure	cwt.	11.50	11.75
Mapico Red 297 (50 lb. bags)	lb.	.1150	.1175
Oximony Iron Oxide	lb.	——	.09
Red Iron Oxide, Light	cwt.	11.50	11.75
Red FBD Dispersed	lb.	——	1.65
2BD, Dispersed	lb.	——	1.65
2BL	lb.	——	1.15
Rubanox Red CP-762 (dlvd.)	lb.	——	1.40
Rubber Red CP-339 (dlvd.)	lb.	——	1.05
Rubber Red RT-364	lb.	——	.75
Rubber Red RT-425	lb.	——	.75
Rubber Red X-1148	lb.	——	.80
Solfast Red CP-663 (dlvd.)	lb.	——	1.80
CP-787 (dlvd.)	lb.	——	1.30
Stan-Tone Red	lb.	1.10	3.05
Vansul Red M.B.	lb.	.80	2.30
Watchung Red	lb.	——	1.90

White—Lithopone

Albalith	lb.	.06¼	.06½
Astrolith	lb.	.06¼	.06⅝
Cryptone No. 19	lb	.07¾	.08
CB No. 21	lbl	.07¾	.08
Eagle	lb.	.06¼	.06½
Permalith	lb.	.06¼	.06⅜
Ponolith	lb.	.06¼	.06⅜
Sunolith	lb.	.06¼	.06⅜

White—Titanium Pigments

Rayox	lb.	.19½	.22½
Ti-Cal	lb.	.07¼	.08¼
Ti-Pure	lb.	.21½	.22½
Titanox A—all grades (dlvd.)	lb.	.19½	.20½
B-30 (dlvd.)	lb.	.07	.07½
C (dlvd.)	lb.	.06¾	.07¼
RA—all grades (dlvd.)	lb.	.21½	.22½
RC-HT (dlvd.)	lb.	.07½	.08
Unitane O-220	lb.	.195	.205
OR-250	lb.	.215	.225
Zopaque	lb.	.19½	.20½

White—Zinc Oxide (American Process)

AZO-ZZZ 11 (and 22, 33, 44, 55)	lb.	.14¾	.15
Eagle	lb.	.14¾	.15
Horse Head Special	lb.	.14¾	.15
XX Red	lb.	.14¾	.15
Protox 166	lb.	.14¾	.15
St. Joe Black Label	lb.	.14¾	.15
Green Label	lb.	.14¾	.15
Red Label	lb.	.14¾	.15

White—Zinc Oxide (Dispersed)

Dispersed Zinc Oxide	lb.	——	13

White—Zinc Oxide (French Process)

AZO-ZZZ 66	lb.	.17	.17¼
Eagle Green Seal	lb.	.16½	.16¾
Eagle Red Seal	lb.	.16	.16¼
Eagle White Seal	lb.	.17	.17¼
Florence Green Seal	lb.	.16½	.16¾
Red Seal	lb.	.16	.16¼
White Seal	lb.	.17	.17¼
Kadox 25	lb.	.17	.17¼
Kadox 15, 17 and 72	lb.	.14¾	.15
U. S. P. 12	lb.	.18	.18¼

White—Zinc Sulfide

Cryptone ZS-800	lb.	.1300	.1325

Yellow

Anchor Brand Pure Iron Oxide	cwt.	9.00	9.25
Cadmolith Yellow (bbls.)	lb.	——	.95
Chrome Yellow	lb.	——	.33
Chrome Yellow 12310	lb.	——	.34
Ferrox	cwt.	7.50	8.50
Mapico Yellow (50 lb. bags)	lb.	.0900	.0925
Rubber Yellow X-1940	lb.	——	1.60
Stan-Tone Yellow	lb.	1.20	1.75
Toluidine Yellow	lb.	——	1.70
YL-556-D	lb.	——	.82
Oximony Iron Oxide	lb.	——	.06¼
Vansul Yellow M.B.	lb.	.90	1.00
Yellow GD, Dispersed	lb.	——	1.85
GL	lb.	——	1.35
HV Paste	lb.	——	.34
Zinc Yellow	lb.	——	.245

DISPERSING AGENTS

Agchem SA-19	lb.	——	.30
SA-20	lb.	——	.70
Aquasol AR 90%	lb.	——	.24¼
Armeen 18	lb.	.52	.60
Beaconol 52	lb.	.60	.75
Darvan No. 1 (and No. 2)	lb.	.21	.30
Daxad 11 (21, 23)	lb.	.08	.35
Dilex	lb.	——	.32
Dispersaid	lb.	1.25	1.35
Halloid	lb.	.03¾	.09½
HornKem No. 1	gal.	——	1.60
No. 3G	gal.	——	1.75
No. 12	lb.	——	.17
Lomar PW	lb.	.16	.18
Marasperse CB	lb.	.11½	.15
N	lb.	.09	.10
Rubbex	lb.	——	.27½
Stan-Chem BQC	lb.	.12¼	.17¼
1067	lb.	——	.13½
1471	lb.	.1687	.2187
2251	lb.	.12¼	.17¼
Trenamine D-25	lb.	.32½	.36
D-100	lb.	.48	.51
Triethanolamine (drums) (dlvd.)	lb.	.21½	.22½
Triton R-100	lb.	.15½	.26
Yelkin TT	lb.	——	.22
Zinsper	lb.	——	.15

EXTENDERS

Advagum 1098	lb.	——	.65
Bunaweld Polymer No. 780	lb.	——	.22
No. 5514	lb.	——	.30
D-92 (and D-93) (dms.)	lb.	——	.12
Extender 600	lb.	——	.1790
PR-162 Latex (dms.)	gal.	1.00	1.60
Synprolac	lb.	——	.19
Synprowax	lb.	.16	.19
Vistanex	lb.	——	.32

FILLERS (Inert and Reinforcing)

Abrasives			
Carbonite	lb.	.15	.95
Lionite	lb.	.09¾	.90
Pumice	lb.	.03	.05
Aluminum Hydrate	lb.	——	.17

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FILLERS (Cont'd)

Aluminum Silicate			
Silical	ton	37.00	- 55.00
Marter White	ton	18.50	- 30.00
Barium Carbonate (l.c.l.)	ton	72.50	- 90.00
Barytes			
No. 1 Floated, White	ton	34.85	- 49.65
No. 2 Floated, Unbleached	ton	——	- 32.85
No. 22 Barytes (c.l.)	ton	——	- 18.37
Foam A	ton	——	- 34.85
Bentonite (c.l.)	ton	——	- 11.50
SPV Volclay (c.l.)	ton	——	- 11.50
Blanc Fixe	ton	72.50	-120.00
Calcium Carbonate			
Atomite (c.l.)	ton	——	- 30.00
B.I. White No. 1 (c.l.)	ton	——	- 7.50
B.I. White No. 2 (c.l.)	ton	——	- 7.00
B.I. White No. 390 (c.l.)	ton	——	- 5.75
Blue-Star XX	ton	——	- 15.00
Calcene T	ton	45.00	- 55.00
Camelwite	ton	——	- 30.00
Kalite (c.l.)	ton	——	- 40.00
Lesamite (c.l.)	ton	——	- 27.50
Lim-Cal (c.l.)	ton	——	- 12.50
Millical (c.l.)	ton	——	- 27.50
Multifex	ton	——	-105.00
Sierracal	ton	15.00	- 18.50
Super Multifex	ton	——	-145.00
Suspenso (c.l.)	ton	——	- 22.00
Swansdown (c.l.)	ton	——	- 20.00
Witcarb R (c.l.)	ton	——	-105.00
R-12 (c.l.)	ton	40.00	- 60.00
York White	ton	——	- 9.00
Calcium Silicate			
Silene EF	ton	110.00	-120.00
Calcium Sulfate, Anhydrous			
Snow White Filler	ton	——	- 18.00
Calcium Sulfate, Hydrous			
Crysta-Cal (c.l.)	ton	——	- 12.50
Terra Alba No. 1	ton	12.00	- 14.40
Chalk Whiting (l.c.l.)	lb.	.0150	- .0175
Recco Paris Whiting	ton	——	- 28.00
Clay			
Alsilite (c.l.)	ton	14.00	- 22.50
Alsite (c.l.)	ton	——	- 14.00
Aluminum Flake	ton	16.50	- 36.00
A.S.P. No. 1 (c.l.)	ton	——	- 35.00
No. 11 (c.l.)	ton	——	- 40.00
Buca (c.l.)	ton	——	- 44.00
Burgess No. 20	ton	——	- 33.00
No. 30	ton	——	- 35.00
Burgess Iceberg	ton	——	- 50.00
Catalpo (c.l.)	ton	——	- 33.00
Champion	ton	——	- 14.00
C.S.D. (c.l.)	ton	——	- 13.00
Crown	ton	——	- 14.00
Dixie (c.l.)	ton	——	- 14.00
Hi-White R	ton	15.00	- 33.00
Hydratex R	ton	30.00	- 50.00
Kaolioid Clay (c.l.)	ton	——	- 10.50
Markham (c.l.)	ton	14.00	- 33.80
McNamee (c.l.)	ton	——	- 13.50
Oldham (c.l.)	ton	——	- 13.00
Paragon	ton	13.50	- 34.50
Recco (c.l.)	ton	——	- 14.00
Stellar-R	ton	——	- 50.00
Suprex	ton	14.00	- 35.00
Upton	ton	19.50	- 21.50
Whitetex (c.l.)	ton	——	- 50.00
Witco No. 1 (c.l.)	ton	13.00	- 33.00
No. 2 (c.l.)	ton	13.00	- 33.00
Diatomaceous Earth	ton	30.00	- 50.00
Kaylorite (c.l.)	ton	——	- 30.00
Dolomite (c.l.)	ton	11.00	- 12.00
Flock			
Cotton, white and colored	lb.	.10	- .20
Filfloc F 40-9000	lb.	——	- .16
Filfloc F 6000	lb.	——	- .22
Rayon, bleached or dyed	lb.	.81	- 1.50
Rayon, grey	lb.	——	- .18
Rayon, pink	lb.	——	- .14
Solka-Floc (l.c.l.)	lb.	.05	- .15
Wool, bleached or dyed	lb.	.70	- 1.00
Glue, Bone (dlvd.)	lb.	.16½	- .18½
Graphite	lb.	.05	- .20
Ground Glass (l.c.l.)	lb.	.04	- .06
Leather, Shredded	lb.	.05	- .17
Lignin	lb.	.03	- .06
Indulin	lb.	——	- .09
Limestone, Pulverized	ton	3.25	- 10.00
Micro Velva	ton	45.00	- 47.00
Velvet Filler, Regular	ton	20.00	- 22.00
Magnesium Carbonate	lb.	.09	- .10
K & M Clearcarb	lb.	.1175	- .1225
Magnesium Oxide	lb.	.05	- .06
Magnesium Silicate	ton	18.00	- 35.00
Airex	ton	22.50	- 23.50
Asbestol	ton	20.00	- 22.00
Blue Star Talc	ton	——	- 23.00
L.S. Silver	ton	23.50	- 25.50
Sierra White	ton	21.25	- 23.25
Mica	lb.	.01¼	- .07¾
Concord	lb.	.0675	- .0750
Micro-Mica	lb.	.06¾	- .07½
Mineralite (c.l.)	ton	25.00	- 40.00
Silversheen	lb.	.06¾	- .07½
Triple A Mica (c.l.)	ton	——	- 25.00
Vermiculite	lb.	.075	- .085
Wet Ground Biotite Mica	lb.	.05½	- .06¼
Wet Ground Mica No. 160	lb.	.06¾	- .07½
Mineral Black			
Keystone 126	ton	15.00	- 20.00

FILLERS (Cont'd)

Pyrophyllite			
Pyrax A (c.l.)	ton	——	- 12.50
WA (c.l.)	ton	——	- 15.00
Silica	ton	16.00	- 27.00
Blue Star	ton	——	- 21.50
Slate, Powdered (l.c.l.)	ton	15.00	- 20.00
Talc, Domestic	ton	9.00	- 20.00
Walnut Shell Flour	ton	38.00	- 80.00
Whiting, Commercial	ton	——	- 12.00
Cametine (c.l.)	ton	8.50	- 10.00
C-C-O White	ton	——	- 17.00
Keystone (c.l.)	ton	——	- 16.00
Rambo No. 1 White	ton	——	- 6.50
No. 6 White	ton	——	- 9.00
Snowflake (c.l.)	ton	——	- 18.00
Veroc (c.l.)	ton	——	- 6.50
Welco (c.l.)	ton	——	- 6.50
York White R (c.l.)	ton	——	- 8.00
Wood Flour	ton	20.00	- 62.18

FINISHING MATERIALS, SURFACE

Beaco Finishes	gal.	1.05	- 1.35
Black Out	gal.	4.50	- 8.00
Shellac, Orange Gum	lb.	.65	- .85
VanWax	gal.	1.25	- 1.30

FLAME RETARDANTS

Celluflux	lb.	.36½	- .38½
Chlorinated Paraffin	lb.	.10	- .25
Halowax	lb.	.24	- .39
Zinc Borate 3167	lb.	.13½	- .14
Zyrox	lb.	.65	- .79

LUBRICANTS, MOLD

Aquadag	lb.	3.15	- 3.45
Aquarex BBX Conc.	lb.	——	- .78
D	lb.	——	- .76
L Paste	lb.	——	- .85
MDL Paste	lb.	——	- .30
Akro Gel	lb.	——	- .165
Borax, Granular (l.c.l.)	ton	70.00	- 80.00
Colite Concentrate (dms.)	gal.	——	- .90
Concentrex	lb.	——	- .25
D.C. 7 Compound	lb.	6.20	- 6.80
D.C. Emulsion No. 35	lb.	2.20	- 3.50
D.C. Mold Release Fluid	lb.	5.20	- 6.00
Dipex	lb.	.14	- .18
Dri-Lube	lb.	——	- .22
Erlen Mold Lubricant	gal.	1.25	- 1.50
Glycerized Lubricant	gal.	——	- 1.75
Glydag	lb.	1.30	- 2.00
Hawkeye Flake (dlvd.)	lb.	——	- .15
Kokobace	lb.	——	- .12
Latex-Lube (dlvd.)	lb.	——	- .20½
Liqui-Lube (dlvd.)	lb.	——	- .15¾
Lubrex	lb.	.25	- .30
Migralube	lb.	——	- .37
Moldeze No. 1	gal.	——	- 36.00
No. 3	gal.	——	- 7.50
Mold Lubricant No. 72 Conc.	gal.	2.50	- 5.50
No. 735	gal.	1.26	- 2.75
Mold-Slick	lb.	.202	- .215
Orvus WA Paste (dms.)	lb.	——	- .25
Prodag	lb.	.25	- .38
Purity Flake (dlvd.)	lb.	——	- .17
Redotex Flakes (dlvd.)	lb.	.14⅞	- .15½
Powder (dlvd.)	lb.	.15⅜	- .16
Rubber-Flo	gal.	——	- 1.15
Rubber-Glo	gal.	——	- .94
Rusco Mold Paste	lb.	——	- .25
Sericite (l.c.l.)	ton	65.00	- 75.00
Thermalube	lb.	——	- .11
Ulco Mold Soap	lb.	.16	- .29
Werkrite Flakes (dlvd.)	lb.	.09⅞	- .10½
Powder (dlvd.)	lb.	.10⅜	- .11¼

LUBRICANTS, RUBBER

Propylene Stearate (drums)	lb.	——	- .40
Rubberol	lb.	——	- .28½

LUBRICANTS, RUBBER SURFACE

Barium Stearate	lb.	.48	- .49
Calcium Stearate	lb.	.39	- .40
Polyethylene Glycol	lb.	.25	- .26
Rexanol	lb.	——	- .13
Separex	lb.	——	- .15
Slab-Dip	lb.	——	- .15
Wet-Zinc	lb.	——	- .25
Zinc Stearate	lb.	.40	- .43

MOLD CLEANERS

Actusol (dlvd.)	gal.	——	- 1.45
Metso 99	cwt.	3.75	- 5.40
Granular	cwt.	3.25	- 4.75
Rubber-Sol	gal.	——	- 2.75
Shelblast	ton	80.00	-140.00
Sprex A.C. (dlvd.)	lb.	——	- .15½

PEPTIZING AGENTS

Peptizer P-12	lb.	.84	- .90
RPA 2	lb.	——	- .65
3	lb.	——	- .46
5	lb.	——	- .57

PLASTICIZERS & SOFTENERS

AA (drums)	lb.	——	- .22
Acto 500	lb.	——	- .09
Adipol BCA (dms.)	lb.	.44½	- .45
2EH	lb.	.47	- .47½
10A	lb.	.47	- .47½

PLASTICIZERS & SOFTENERS (Cont'd)

Amalgamator Z-4	lb.	——	- .30
American Pine Tar	gal.	.34½	- .43½
Arneel	lb.	.29	- .34
Arolene 1980 (c.l.)	lb.	——	- .10
2286	lb.	——	- .25
Bardol	lb.	.02½	- .03¾
B	lb.	.05½	- .05¾
Bayol D	gal.	——	- .382
F	gal.	——	- .52
Beeswax, Refined & Bleached	lb.	.64	- .74
Yellow Refined	lb.	.63½	- .68
Bondogen	lb.	.55	- .60
B.R.C No. 20	lb.	.0125	- .0135
B.R.H. 2	lb.	.02	- .029
BRS 700	lb.	.0175	- .026
B.R.T. 3	lb.	.024	- .025
4	lb.	.0225	- .0235
7	lb.	.0265	- .0275
B.R.V.	lb.	.0325	- .04
Bunarex Resins	lb.	.06	- .0750
Bunatak M	lb.	——	- .20
O	lb.	——	- .18
R	lb.	——	- .14
U	lb.	——	- .15
No. 21	lb.	——	- .08
No. 90	lb.	——	- .08
No. 865	lb.	——	- .17
No. 1080	lb.	——	- .09½
Burgundy Pitch	lb.	.1026	- .1050
Butac	lb.	.11	- .12
Butoxyethyl Diglycol Carbonate	lb.	.40	- .41
Butyl Benzyl Sebacate	lb.	——	- .575
Butyl Carbitol Perlargonate (dms.)	lb.	——	- .645
Butyl Cellosolve Perlargonate (dms.)	lb.	——	- .68
Butyl Palmitate	lb.	——	- .26½
Butyl Roleate	lb.	.176	- .18
Butyl Stearate	lb.	——	- .405
BWH-1	lb.	——	- .14
Califlux 510, 550	lb.	.025	- .0325
G.P.	lb.	.0125	- .02
R-100	lb.	.05	- .0575
Campol (t.c.)	ton	——	- 42.00
Candelilla Wax Prime	lb.	.67	- .75
Capryl Benzyl Sebacate	lb.	——	- .6325
Carbonex	lb.	.0325	- .0375
S Flakes	lb.	.0475	- .0525
S Plastic	lb.	.046	- .051
644	lb.	.0375	- .04
Carbowax 4000 (drums)	lb.	.31	- .32
Cardolite 615	lb.	.37	- .40
816	lb.	.25½	- .28½
5858	lb.	.42	- .46
Carnauba Wax, Crude	lb.	.73	- .82
Refined	lb.	.81	- .85
Substitute	lb.	.45	- 1.08
Yellow	lb.	1.15	- 1.20
Celluflex	lb.	.36½	- .38½
Ceresine Wax	lb.	.14	- .26
Contogum	lb.	.06¾	- .10¾
Cumar Resins	lb.	.05½	- .14½
D.C. 200 Fluid	lb.	5.20	- 6.00
D.B.M.	lb.	——	- .30
Degras, Common	lb.	.12	- .14
Diamylphenol (l.c.l., dms.)	lb.	——	- .28
Dibenzyl Sebacate	lb.	——	- .6875
Dibutoxethyl Sebacate	lb.	——	- .5634
Dibutyl Phthalate	lb.	——	- .32
Dibutyl Sebacate—Tech.	lb.	——	- .545
C.P.	lb.	——	- .565
Dicapryl Adipate	lb.	——	- .40
Dicapryl Phthalate	lb.	——	- .42
Dicapryl Sebacate	lb.	——	- .57
Di-Carbitol Phthalate (dms.)	lb.	.43½	- .44
Dicyclohexyl Phthalate	lb.	——	- .43
Dielex	lb.	.0625	- .0650
Diethyl Phthalate (t.c.)	lb.	——	- .32
Dihexyl Adipate	lb.	——	- .36
Dihexyl Phthalate	lb.	——	- .31
Dihexyl Sebacate	lb.	——	- .4475
Di Isobutyl Azelate (dms.)	lb.	——	- .715
Dimethyl Phthalate	lb.	——	- .22
Dimethyl Sebacate	lb.	——	- .71
Dinopol (dms.)	lb.	.523	- .533
Dioctyl Phthalate (dms.)	lb.	.44½	- .45½
D.I.O.P. (dms.)	lb.	.44½	- .45½
Dipolymer Oil	gal.	.33	- .38
Dispersing Oil No. 10	lb.	.0525	- .055
Dutrex A (B, 5, 6)	lb.	.02½	- .03¾
15	gal.	.10	- .189
20, 21, 25	lb.	——	- .03
ELA	lb.	——	- .80
Estac	lb.	——	- .16
Ethox (dms.)	lb.	.44½	- .45
Flexol DOP	lb.	——	- .45
TOF	lb.	.47½	- .49
3GH	lb.	.43½	- .44
3GO	lb.	.53	- .53½
4GO	lb.	——	- .38
8N8	lb.	.39	- .39½
Galex W-100	lb.	.13½	- .15
G. B. Light Process Oil	lb.	.025	- .0325
H-70	lb.	.56¾	- .64½
Hercoyln (dlvd.)	lb.	.1675	- .1725
Herron-H.T.	gal.	.2400	- .2700
Herron-Plas	lb.	.0350	- .0375
Herron-Wax	lb.	.0500	- .0550
HT-300	lb.	.45¾	- .53
Indonex 632½ (633½, 634½, 638½)	gal.	.1200	- .1700
Indopol H-300 (bbls.)	gal.	1.28	- 1.32
IMH	lb.	——	- .85
Kapsol	lb.	——	- .42

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PLASTICIZERS & SOFTENERS (Cont'd)

KP 23 (dms.)	lb.	.39½	.40
70 (dms.)	lb.	.41	.41½
120 (dms.)	lb.	——	.40
140 (dms.)	lb.	.49½	.50
150 (dms.)	lb.	.41½	.42
201	lb.	——	.43
Kronisol (drums)	lb.	.41	.41½
Kronitex (drums)	lb.	.38	.38½
Lanolin, Tech. Anhydrous	lb.	.16	.18
Lead Oleate	lb.	.16½	.42
Lindol	lb.	.37	.38½
2-Mercaptoethanol (drums)	lb.	——	.75
Methox (dms.)	lb.	.41	.41½
Methyl Laurate	lb.	.25	.27
Methyl Oleate	lb.	——	.20
Methyl Stearate	lb.	——	.70
Monoplex DBS	lb.	.58	.59
Monoplex DCP	lb.	.40½	.41
Monoplex DOS	lb.	.69	.70
5 (dms.)	lb.	.70	.71
11 (dms.)	lb.	.50	.51
16 (dms.)	lb.	.45	.46
Montan Substitute No. 506	lb.	.32	.33
Montan Wax, Crude	lb.	.30	.35
Montan Wax (c.l.)	lb.	.52	.55
Monty Wax	lb.	——	.35
Natac	lb.	.1050	.1150
Neolene 210 (t.c.)	lb.	——	.16
212 (t.c.)	lb.	——	.14
220 (t.c.)	lb.	——	.15
Nerium	lb.	——	.09
Nevillac Resins (dms.)	lb.	.23	.45
Neville Resins (dms.)	lb.	.10½	.15½
Nevindene Resins (dms.)	lb.	.12½	.15½
Nevinol (dms.)	lb.	——	.17
Nevoll	lb.	.0325	.0425
Nevtex 10 (dms.)	lb.	——	.10½
Nuba 1 (and 2) (dms.)	lb.	——	.04
3X (dms.)	lb.	——	.065
15 (and 30) Oil (dms.)	lb.	——	.24
781 Oil (dms.)	lb.	——	.27
No. 480 Oil Proof Resin	lb.	——	.15
Ohopex Q10 (dms.)	lb.	.44½	.45½
Opalwax	lb.	.37	.38
Ortho-Nitrobiphenyl	lb.	.06	.11
Ozokerite Wax No. 64			
White	lb.	.31	.32
Yellow	lb.	.25	.26
P-1 (and 4, 6, 8, 20)	lb.	.29½	.33½
P-75	lb.	.66	.72
Pale 4 (and 1000)	lb.	——	.24
Palm Oil	lb.	——	.11
Paradene Resins (dms.)	lb.	.065	.075
Para Flux (dms.)	gal.	.1875	.1975
2016 (l.c.l.)	gal.	.22	.23
Para Lube (l.c.l.)	lb.	.046	.048
Paraplex G-25	lb.	.76	.77
G-40	lb.	.43	.44
G-50	lb.	.39½	.40½
Parmo	lb.	.06	.13½
Pentalene 90 (l.c.l., dms.)	lb.	——	.245
92 (l.c.l., drums)	lb.	——	.26
Pentaphen No. 114 (l.c.l., bags)	lb.	——	.27
Pepton 22	lb.	.72	.75
PG-16 (drums)	lb.	——	.23½
Philplast No. 1	gal.	.18	.35
No. 2	gal.	.13	.35
Picco 10 (and 25)	lb.	——	.12
75 (and 100)	lb.	——	.11½
Rubber Resin 100	lb.	.13¼	.13¾
S.O.S.	gal.	.29	.34
Piccocizer 30	lb.	.05½	.06
Piccolastic A (and B, C, D, E)	lb.	.22	.22½
F	lb.	.139	.144
Piccolyte S Resins	lb.	.1500	.1575
Piccolyte WW Resins	lb.	.45	.47
Piccoumaron Resins	lb.	.06½	.14½
Piccovar	lb.	.12	.12½
Piccovol	lb.	.02½	.04
Pictar	gal.	.25	.30
Plas-Blend 360	lb.	.03	.04
Plastac M	lb.	——	.09¼
Plasticizer No. 50B	lb.	.365	.385
Plasticizer SC	lb.	.36	.38
Plasticizer VA-1	lb.	——	.40
Plasticizer XP-3	lb.	——	.50
Plastoflex 3	lb.	——	.50
50	lb.	——	.38
J-21	lb.	——	.41
Plastogen	lb.	.07¾	.08
Plastolein 9050	lb.	——	.45
9055	lb.	——	.37
9058	lb.	——	.45
9250	lb.	——	.32
9715	lb.	——	.36
Plastolein X-55 (dms.)	lb.	——	.60
X-148 (dms.)	lb.	——	.70
Plastone	lb.	.27	.30
Polymel D	lb.	——	.20
Polymel Liquid	gal.	.12	.17
Polymel Resins	lb.	.029	.05
Process Oil C-255	gal.	——	.22
PT 400 Pine tar (600, 800) (t.c., dms.)	gal.	.34½	.45½
Reogen	lb.	.11¾	.12
465 Resin (drums)	lb.	——	.0575
Resin 731-C	cwt.	——	14.75
Resin C	lb.	.02	.0275
Resinex	lb.	.03¼	.04
L-4	lb.	.02¼	.03
Ridbo 369 (drums)	lb.	.08	.09
369-F (drums)	lb.	——	.12

PLASTICIZERS & SOFTENERS (Cont'd)

Rosin Oil	gal.	.54	1.20
R.P.A. No. 2	lb.	——	.65
No. 3	lb.	——	.46
No. 5	lb.	——	.57
R.S.O. Softening Oil	lb.	.03	.05
Rubtar	gal.	——	.40
Santicizer B-16	lb.	.50	.57
E-15	lb.	.47	.54
M-17	lb.	.44	.51
No. 140	lb.	.31	.38
Sealol 42	gal.	——	1.10
Softener No. 20	gal.	.09	.25
S.P.C.	lb.	——	.19½
Stanolind Petrolatum	lb.	.037	.081
Wax	lb.	.25	.30
Staybelite Resin (dms.)	lb.	——	.11
Sunny South Burgundy Pitch	cwt.	10.51	10.75
Sunny South Pine Tar	gal.	.34½	.43½
Sunny South Rosin Oil	gal.	.50	.67¾
Superla Wax	lb.	.25	.30
Syncera Wax	lb.	.175	.225
Synplasticizer	lb.	——	.10
Syn Tac (c.l.)	gal.	——	.33
Synthol	lb.	——	.24½
Tar, Refined	gal.	.12	.17
K-Tarnel NR (t.c.)	lb.	——	.0851
Terpene A	gal.	——	.65
TP-90B	lb.	——	.65
TP-95	lb.	——	.55
TP98	lb.	——	.50
Triacetin	lb.	.34	.45
Tricresyl Phosphate	lb.	.36½	.38½
Turgum S	lb.	.09½	.10½
Vanadiset A	gal.	.13	.20
Vanadiset B, C, D	lb.	.022	.055
Pulverized	lb.	.064	.09
Solution	gal.	.40	.65
Vistac No. 1	gal.	——	1.32
No. 2	gal.	——	1.66
No. 4	gal.	——	1.80
Witresin—Granular	ton	41.00	43.00
Solid	ton	36.00	38.00

PROCESSING AIDS

Castor Oil, Processed (dms.)	lb.	——	.24
Refined (drums)	lb.	——	.15¾
Castorwax (min. 400 lbs.)	lb.	——	.31
Dutrex 7	lb.	.02½	.03¾
30	gal.	.24	.27
ELA	lb.	——	.80
Heron S.P.O.	lb.	.22	.23
Millrex	lb.	——	.15
Resin No. 510	lb.	.13½	.16½

PROTECTIVE & STABILIZING AGENTS

Acacia	lb.	.12¾	.21
Agchem SA-9 (to SA-12)	lb.	.65	1.02
Alpha Protein	lb.	.20	.24
Aroostocrat	lb.	——	.07½
Carob Bean Flour	lb.	.33	.35
Casein	lb.	.28	.35
Ethylene Diamine 68%	lb.	.57	.58
Karaya Gum	lb.	.20	.50
Prosein	lb.	.0575	.0605
Rex Compound No. 2801	lb.	——	.15
Sodium Alginate	lb.	——	1.50
Stablex B	lb.	——	.95
Tragacanth Flakes	lb.	.60	1.35

RECLAIMING AGENTS

Armeers C	lb.	.50	.58
T	lb.	.42	.50
No. 517 H.B. Oil	gal.	.11½	.16½
535	gal.	.22	.27
C-6 Oil (and 28, 32)	gal.	.33	.38
C-10 Oil	gal.	.25	.30
C-33 Oil	gal.	.20	.25
Caustic Soda—Flake 76% (c.l., drums)	cwt.	——	3.45
Liquid 50% (t.c.)	cwt.	——	2.40
Solid 76% (c.l., dms.)	cwt.	2.50	3.05
Cresylic Acid (99-100%)	gal.	1.55	1.69
D-4	gal.	.23	.28
E-5	gal.	.21	.26
G. B. Reclaiming Oil	gal.	.12	.18
Heavy Aromatic Naphtha (t.c.)	gal.	——	.125
LX-77 Reclaiming Solvent	gal.	.18	.24
LX-572 Reclaiming Oil	gal.	.23	.28
Neo-Fat D-242	lb.	.05½	.07¾
PT 67 Light pine oil	gal.	.60	.70
PT 101 Pine tar oil	gal.	.32	.43
PT 150 Pine solvent	gal.	.44	.45
Q Oil	gal.	.246	.296
Reclaiming Oil 1621	lb.	.03	.04
Reclaiming Oil 3186 (t.c.)	gal.	——	.295
Reclaiming Oil 3186-G	gal.	——	.26
Reclaiming Reagent No. 4	lb.	.12	.15
Reclaiming Resin No. 1	gal.	.15	.35
R.P.A. No. 3	lb.	——	.46
Soda Ash (c.l., bags)	cwt.	——	1.40
Solvent 534	gal.	.22	.27
Solvent Oil 21	gal.	.24	.29
C-42	gal.	.27	.32
Union Solvent 4060-O	gal.	——	.199
X-1 Resinous Oil	lb.	.0175	.0250
X-60 Solvent	gal.	.24	.32

REINFORCING AGENTS—CARBON BLACK

Channel, Hard Processing (HPC) (bags)

Atlantic HPC-98	lb.	.0740	.1175
Continental F	lb.	.0740	.1125
Croflex	lb.	.0740	.1125
Crow	lb.	.0740	.1125
Dixiedensed (and S)	lb.	.0740	.1125
Kosmobile (and S)	lb.	.0740	.1125
Kosmos T	lb.	.0740	.1125
Micronex HPC	lb.	.0740	.1125
Spheron 4	lb.	.0740	.1170
Witco Disperso No. 6	lb.	.0732	.1125

Channel, Medium Processing (MPC) (bags)

Atlantic MPC-95	lb.	.0740	.1175
Continental A	lb.	.0740	.1125
Croflex TH	lb.	.0740	.1125
Dixie R-1	lb.	.0740	.1125
Dixiedensed HM (and S-66)	lb.	.0740	.1125
Huber Arrow TX	lb.	.0740	.1150
Kosmobile HM (and S-66)	lb.	.0740	.1125
Kosmos M	lb.	.0740	.1125
Micronex Standard	lb.	.0740	.1125
Spheron 6	lb.	.0740	.1170
Texas M	lb.	.0740	.1125
Witco Disperso No. 1	lb.	.0732	.1125

Channel, Easy Processing (EPC) (bags)

Atlantic EPC E-42	lb.	.0740	.1175
Continental AA	lb.	.0740	.1125
Croflex 77	lb.	.0740	.1125
Dixiedensed 77	lb.	.0740	.1125
Kosmobile 77	lb.	.0740	.1125
Micronex W-6	lb.	.0740	.1125
Spheron 9	lb.	.0740	.1170
Texas E	lb.	.0740	.1125
Witco Disperso No. 12	lb.	.0732	.1125
Wyex	lb.	.0740	.1150

Channel, Conductive (CC) (bags)

Dixie 5 dustless	lb.	.0832	.1375
Kosmink dustless	lb.	.0832	.1375
Spheron C	lb.	.1200	.1600
Spheron I	lb.	.1000	.1400
Spheron N	lb.	.2200	.2500
Voltex	lb.	.1500	.1850

Furnace, Fast Extruding (FEF) (bags)

Statex M	lb.	.0550	.0950

Furnace, High Modulus (HMF) (bags)

Continex HMF	lb.	.0500	.0900
Dixie 40	lb.	.0500	.0900
Dixie 50	lb.	.0550	.0950
Kosmos 40	lb.	.0500	.0900
Kosmos 50	lb.	.0550	.0950
Modulex	lb.	.0500	.0900
Philblack A	lb.	.0550	.0950
Statex 93	lb.	.0500	.0900
Sterling T	lb.	.0500	.0900
Sterling SO	lb.	.0550	.0950

Furnace, Reinforcing (RF) (bags)

Dixie 60	lb.	.0740	.1125
Kosmos 60	lb.	.0740	.1125

Furnace, Semi-Reinforcing (SRF) (bags)

Continex SRF	lb.	.0350	.0775
Dixie 20	lb.	.0350	.0775
Essex	lb.	.0350	.0775
Furnex	lb.	.0350	.0775
Gastex	lb.	.0350	.0775
Kosmos 20	lb.	.0350	.0775
Pelletex	lb.	.0350	.0775
Seminex	lb.	.0350	.0775
Sterling NS	lb.	.0375	.0775
Sterling R	lb.	.0350	.0775
Sterling S	lb.	.0350	.0775

Furnace, Fine (FF) (bags)

Statex B	lb.	.0575	.0975
Sterling 99	lb.	.0650	.1050

Furnace, High Abrasion (HAF) (bags)

Philblack O	lb.	.0745	.1145
Vulcan 1	lb.	.0740	.1170
3	lb.	.0740	.1170

Furnace, Very Fine (VFF) (bags)

Statex K	lb.	.0740	.1125
Sterling 105	lb.	.1200	.1600

Thermal, Fine (FT) bags)

P-33	lb.	——	.0500

Thermal, Medium (MT) (bags)

Thermax (c.l.)	lb.	——	.0300
Thermax, Stainless	lb.	——	.0350

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SYNTHETIC RESINS

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GARY, INDIANA

Final Reminder

on the 1949

Rubber Red Book

If you have not yet returned the forms sent you for listing your products, personnel, etc., in the 1949 RUBBER RED BOOK, please send them in no later than APRIL 30.

Unless this information is received by that date it may be necessary to omit your company from the 1949 edition.

RE: ADVERTISING

If you are considering the use of advertising space your reservation should be sent in promptly but copy will be accepted up to May 30.

RUBBER RED BOOK

250 West 57th Street,
New York 19, N. Y.

REINFORCING AGENTS—MISCELLANEOUS

Darex Copolymer No. 3 (and X34)	lb.	.35	.37
No. X43	lb.	.36	.38
Darex Copolymer Latex No. 3 (and X34)	lb.	.36½	.50
Durez 12687 (and 12707)	lb.	—	.32
Durez 13355	lb.	—	.26
Marbon S and S-1	lb.	.36	.43
Marmix	lb.	.36	.43
Pliolite S6 Resin	lb.	.36	.37
G Masterbatch	lb.	.35	.36
G50 Masterbatch	lb.	.35	.36
R Masterbatch	lb.	.38	.39
Polyco 220	lb.	.13	.15

RETARDERS

ESEN	lb.	.36	.38
Retarder ASA	lb.	—	.45
Retarder W	lb.	—	.43
Retardex	lb.	—	.51

RUBBER SUBSTITUTES

Mineral Rubber

38	ton	26.00	32.50
Black Diamond	ton	26.00	27.50
Byerlyte	ton	42.50	57.50
Gilsonite, Selects (c.l.)	ton	36.50	37.50
Hard Hydrocarbon (dms.)	ton	44.50	46.50
Herron Flake	ton	48.50	49.50
Mineral Rubber, solid	ton	41.60	43.00
Pioneer	ton	33.00	60.00

Vulcanized Vegetable Oils (Factice)

Amberex	lb.	.30	.38
Brown	lb.	.1300	.3300
Dispersed	lb.	.27	.44
Neophax	lb.	.18	.36
White	lb.	.1300	.3200

Miscellaneous Rubber Substitutes

Gilsowax	lb.	.04½	.05
Insulac	lb.	.06	.06½
Resin No. 1098 (drums)	lb.	—	.65
No. 1198	lb.	.31	.35

SOLVENTS

Acetone (dlvd.)	lb.	.07½	.09½
American Dipentent	gal.	—	.35
Amsco Lactol Spirits (t.c.)	gal.	—	.16
Rubber Solvent (t.c.)	gal.	—	.15
Solv A (t.c.)	gal.	—	.22
Solv A-80 (t.c.)	gal.	—	.265
Solv B (t.c.)	gal.	—	.26
Solv B-90 (t.c.)	gal.	—	.29
Solv D (t.c.)	gal.	—	.285
Solv F (t.c.)	gal.	—	.285
Special Napthalite (t.c.)	gal.	—	.15
Textile Spirits (t.c.)	gal.	—	.16
Amyl Chlorides, Mixed (l.c.l.) (drums)	lb.	—	.08
Aromatic Solvent 40	gal.	—	.199
Benzol 90%	gal.	.17	.24
Butyl Acetate (t.c.)	lb.	—	.175
Butyl Alcohol (t.c.)	lb.	—	.175
Secondary (dlvd.)	lb.	.10½	.12½
Tertiary (dlvd.)	lb.	.12	.14
Carbon Bisulfide, Tech.	lb.	.05	.08
Carbon Tetrachloride	gal.	—	.80
Cosol 1	gal.	.30	.38
Cosol 2	gal.	.30	.38
Cyclohexane	lb.	.08	.10
Cyclohexanone	lb.	.25	.27 a
Diacetone, Pure (dlvd.)	lb.	.12	.14
Dichlorethyl Ether (dms.)	lb.	.165	.17
Formal (dms.)	lb.	.265	.27
Dichloropentane (l.c.l.)	lb.	—	.04½
Dipentene 122 (dms.)	gal.	.35	.36
Ethyl Alcohol (t.c.)	gal.	—	.375
Ethyl Alcohol SD-1 (t.c.)	gal.	—	.43
Ethyl Alcohol SD-2B (t.c.)	gal.	—	.41½
Ethylene Dichloride (drums, dlvd.)	lb.	.08	.09½
Halowax Oil	lb.	.25	.37
Heptanes (t.c.)	gal.	—	.16
Hexalin Cyclohexanol	lb.	.20	.22 a
Hexanes (t.c.)	gal.	—	.16
Isopropyl Alcohol, Ref. 99% (dvld.)	gal.	.25½	.38½
Ether, Ref. (dlvd.)	lb.	.04½	.06½
Mesityl Oxide (dlvd.)	lb.	.115	.135
Methanol (dms., dlvd.)	gal.	.43	.495
Methyl Acetone, Syn. (drums, dlvd.)	gal.	.615	.65
Methyl n-Amyl Ketone (drums)	lb.	.37	.39

SOLVENTS (Cont'd)

Methyl Ethyl Ketone	lb.	.10	.12
Methyl Isobutyl Ketone (dlvd.)	lb.	.125	.145
N-5 Pentane Mix. (t.c.)	gal.	—	.11½
N-6 Hexanes (t.c.)	gal.	—	.14
N-7 Hexanes (t.c.)	gal.	—	.13
Petrolene (t.c.)	gal.	—	.10½
Picolines, Aplha, Refined	lb.	.75	1.00
Mixed	lb.	—	.45
Proprietary Alcohol (t.c.)	gal.	—	.43½
Pyridine, Refined	lb.	.80	.89
Quinoline	lb.	.50	.60
Rubber Solvent (t.c.)	gal.	—	.15
Rubsol (t.c.)	gal.	—	.08625
Skellysolve B (Hexanes) (t.c.)	gal.	—	.141
C (Heptanes) (t.c.)	gal.	—	.133
E (Octanes) (t.c.)	gal.	—	.155
R (Solvent Naphtha)	gal.	—	.109
Solvenol (dms.)	gal.	—	.36
Solvent, Crude, Light	gal.	.19	.28
Solvesso 100 (t.c.)	gal.	—	.27
150 (t.c.)	gal.	—	.27
Sunny South Dipentene	gal.	—	.35
Toluene (drums)	gal.	—	.28
Toluol (t.c.)	gal.	—	.30
Trichlorethane	lb.	.11	.12
Triglycol Dichloride (dms.)	lb.	.519	.59
Tromex	lb.	.078	.083
Union Thinner 1	gal.	—	.149
3	gal.	—	.149
7	gal.	—	.139
X-7 Sp. Heptanes (t.c.)	gal.	—	.11
Xylene (drums)	gal.	—	.30

STABILIZING AGENTS (for Vinyl Resins)

Dutch Boy DS-207	lb.	—	.55
Plumb-O-Sil A	lb.	—	.2975
B	lb.	—	.3075
Tribase	lb.	—	.28¼
Dythal	lb.	—	.42¼
Eagle Basic Silicate White Lead	lb.	.1700	.2150
Lead Stearate, Precip.	lb.	.55	.57
Fused	lb.	.60	.62
Lithium Stearate	lb.	.75	.77
Stabelan A	lb.	.55	.65
G Paste	lb.	—	1.00
XL	lb.	.55	.65
Stabilizer V-7939	lb.	—	.60
Stabilizer JCX	lb.	.49	.51
SN	lb.	—	.42
V-1-N	lb.	.44	.50
V-9	lb.	—	.85
Vanstay	lb.	.33	.35

SUN CHECKING AGENTS

Antisol	lb.	.25	.26
Heliozone	lb.	.25	.26
Sunproof	lb.	.25	.26
Jr.	lb.	.18	.19
Tonox	lb.	.50	.52
Witco Sunolite	lb.	.23	.24

TACKIFIERS

Advaresin 100	lb.	.13½	.14
Agchem RC 30	gal.	.65	1.34
Amberol ST-137X	lb.	.33	.33½
Arcco 493-49B	lb.	.15	.17
700-25A	lb.	.14	.16
U2-24	lb.	.11	.13
Beckopol 1400 (dlvd.)	lb.	.25½	.26
Dutrex 44	gal.	—	.919
E-310 Resin Emulsion	lb.	—	.14
Galex (drums)	lb.	—	.15
Koresin	lb.	—	.75
Liquid Rubber Flux	lb.	—	.125
Pentalyn Resins (dlvd.)	lb.	.19½	.22½
Resin V	lb.	—	.23¾
Rubtack	lb.	—	.12
Staybelite Esters (dlvd.)	lb.	.2100	.2150
Super-Beckacite No. 1001 (dlvd.)	lb.	.34	.34½
Vistac No. 1	gal.	—	1.32
No. 2	gal.	—	1.66
No. 4	gal.	—	1.80

THICKENERS (FOR LATEX)

Acrysol GS	lb.	.14½	.22
Alcogum A-5	lb.	.10	.12
Betanol (drums)	lb.	—	.70
Emulsorex No. 5	lb.	—	.35
Lecithin	lb.	.12	.17
Polyco 296	lb.	.13	.15
Propylene Laurate (dms.)	lb.	—	.36
Sodium Silicate	cwt.	1.10	2.00

VULCANIZING AGENTS

Selenium

Vandex	lb.	—	2.00

Sulfur

Blackbird	cwt.	—	2.30
Crystex (l.c.l.)	lb.	.19½	.23
Dispersed Sulfur	lb.	—	.09
No. 2	lb.	.10	.15
Devil (c.l.)	cwt.	—	1.75
Insoluble Sulfur 60	lb.	.13	.13½
Spider	cwt.	—	2.30
Star (c.l.)	cwt.	—	2.25
Tire	cwt.	1.75	2.35
Tube (c.l., dlvd.)	cwt.	2.25	2.85

Tellurium

Latex Telloy	lb.	—	2.00
Telloy	lb	—	2.00

Miscellaneous Vulcanizing Agents

VA-3	lb.	.55	.65

WASHING & FINISHING AGENTS

Apcolene (t.c.)	gal.	—	.09½

WETTING AGENTS

Advawet No. 10	lb.	—	.35
No. 15	lb.	—	.18
No. 33	lb.	.40	.43
Aerosol OT 70% Clear	lb.	.80	1.00
Agchem SA-15 (16, 18)	lb.	.17	.29
Alrosol (dms.)	gal.	—	.48
Aquarex D	lb.	—	.76
ME	lb.	—	.92
NS	lb.	—	.60
SMO	lb.	—	.50
Areakap 50	lb.	.30	.38
Dry 100	lb.	.60	.72
Aresket 240	lb.	.30	.38
Dry 300	lb.	.60	.72
Aresklene 375	lb.	.42	.57
Dry 400	lb.	.70	.84
Armacs	lb.	.29	.76
Arquads	lb.	.24	.27
Etho-chemicals	lb.	.34	.80
Lecithin	lb.	.12	.17
Santomerse D	lb.	.43	.65
S	lb.	.12	.25
Sorbit P	lb.	—	.28
Stablex G	lb.	—	.70
Trenamine W-50	lb.	.20	.22
Triton K-60	lb.	.33½	.41
N-100	lb.	.59½	.67
R-100	lb.	.14½	.25
720	lb.	.30½	.38
770	lb.	.21¾	.29¼
Vultamol	lb.	—	.17½

MISCELLANEOUS CHEMICALS

Acto 450 (550-W, 600, 630)	lb.	.109	.145
Agchem SA-17	lb.	—	.29
Aquarex SMO	lb.	—	.50
A.S.T.M. Oil No. 1 (and No. 3)	gal.	1.00	1.15
Copper Inhibitor X-872-L	lb.	—	1.75
2-Ethylhexanol (dms.)	lb.	.25	.26
Glycerine, 88% Sap., Crude (dlvd.)	lb.	.20½	.21
MODX (tons)	lb.	—	.29½
Para Resin No. 1784	lb.	—	.09¾
No. 2457 (c.l.)	lb.	—	.04
No. 2718 (c.l.)	lb.	—	.04
pHR	lb.	—	2.00
Pigmented Filmite	lb.	—	.16½
Polyvinyl Methyl Ether	lb.	—	1.00
Reference Fluid SR-6	gal.	.85	1.00
SR-10	gal.	.60	.75
Resin No. 1226	lb.	.31½	.36½
Resorcinol	lb.	—	.75
Rio Resin	lb.	.50	.52
Rubber Resin LM-4	lb.	.28	.30
Santocel	lb.	—	.50
Sublac	lb.	.30	.32
Syntpep N (drums)	lb.	—	.54
Thiokol LP-2	lb.	—	.90
LP-3	lb.	—	.90
Tysonite	lb.	.21½	.22¼
Vanfre	gal.	2.00	2.50
Vinsol Resin—Lumps	cwt.	—	5.00

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If Your Production Suffers From:

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3. Dull,
4. Poor release causing separation in rubber
5. Obnoxious odors
6. Overwhelming cost of Lubricant

Try a sample of our Mold Lubricant #735 and cure your troubles

Whenever you see molded rubber with a clean, bright, glossy finish, you can bet the Rubber Manufacturer will tell you he is using Mold Lubricant #735.

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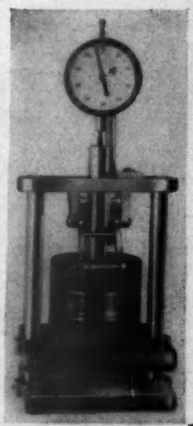

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Display or Classified advertisements in borders: $10.00 per column inch; maximum, 85 words per inch.
All Classified Advertising must be paid in advance except for advertisers on contract. Send check with copy.
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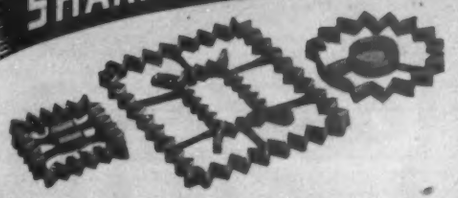

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INDEX TO ADVERTISERS

A

Adamson United Co. ..... —
Advance Solvents & Chemical Corp. ..... —
Akron Equipment Co. 99
Albert, L., & Son 112
American Cyanamid Co.
Calco Chemical Division 13
Industrial Chemicals Division 31
American Firstoline Corp. ..... —
American Polymer Corp. ..... —
American Zinc Sales Co. ..... —
Ames, B. C., Co. 95
Argus Chemical Laboratory Inc. ..... —
Atlas Electric Devices Co. ..... —

B

Baird Rubber and Trading Co. 103
Baker & Adamson Products, General Chemical Division, Allied Chemical & Dye Corp. ... —
Baker, J. T., Chemical Co. ..... —
Barrett Div., Allied Chemical & Dye Corp. .. 34
Beacon Co. 22
Bestread Products Co. 110
Biggs Boiler Works Co. ..... —
Binney & Smith Co. ..... Insert Following 68
Black Rock Mfg. Co. 93
Bonwitt, Eric 111
Bridgwater Machine Co. ..... —
Brockton Cutting Die & Machine Co. 101
Brooklyn Color Works, Inc. ..... —
Brown Co. 101

C

Cabot, Godfrey L., Inc. 25
Cambridge Instrument Co. 91
Cameron Machine Co. 82
Carbide & Carbon Chemicals Corp. ..... —
Carey, Philip, Mfg. Co. 109
Carter Bell Mfg. Co. 94
Ceylon Produce & Rubber Co. ..... —
Chemical & Pigment Div., The Glidden Co. —
CLASSIFIED ADVERTISING 110, 111, 112
Cleveland Liner & Mfg. Co. ..... Back Cover
Colledge, E. W., General Sales Agent, Inc. .. —
Columbian Carbon Co. ..... Insert Following 68
Concord Mica Corp. 117
CONSULTANTS SECTION 112
Continental Carbon Co. 8
Coulter, James, Machinery Co. 88

D

Dewey and Almy Chemical Co. 90
Diamond Alkali Company
Pure Calcium Prod. Div. 16
Dow Chemical Co. ..... —
Dow Corning Corp. 84, 92
du Pont de Nemours, E. I. & Co., Inc.
Pigments Department 33
Rubber Chemicals Div. ....Second Cover & 89, 93

E

English Mica Co. 109
Erie Engine & Mfg. Co. ..... —

F

Falls Engineering & Machine Co. ..... —
Farrel-Birmingham Co., Inc. 17
Fawick Airflex Co., Inc. ..... —
Flintkote Co., The 7
Foremost Machine Builders, Inc. ..... —
Foxboro Company 86

G

Gammeter, W. F., Co. 109
General Atlas Carbon Co. 35
General Chemical Division, Allied Chemical & Dye Corp. ..... —
General Electric Co., Chemical Dept.
Resin & Insulation Materials Div. 24
General Latex & Chemical Corp. 26
General Magnesite & Magnesia Co. ..... —
Genseke Brothers ..... —
Gidley, Philip Tucker 112
Glidden Co., Chemical & Pigment Div. ..... —
Goodrich, B. F., Chemical Co., (Chemical) .. —
Godrich, B. F., Chemical Co. (Hycar) 3
Goodyear Tire & Rubber Co., (Chemical Div.) 5, 9
Grant Engineering Co. 112

H

Hall, C. P., Co. 85
Harwick Standard Chemical Co. 11
Heveatex Corporation ..... —
Hoggson & Pettis Mfg. Co. 97
Holliston Mills, Inc. ..... —
Howe Machinery Co., Inc. 112
Huber, J. M., Corp. 36

I

Independent Die & Supply Co. 112
Indoil Chemical Co. ..... —
Industrial Ovens, Inc. 12
Interstate Welding Service ..... —

J

Johnson Steel & Wire Co., Inc. 111

K

Keasbey & Mattison Co. ..... —
Koppers Co., Inc., Chemical Div. 32

L

Lambert, E. P., Co. 105
Latex Distributors, Inc. 105
Littlejohn & Co., Inc. 105

M

Marbon Corp. 107
Marine Magnesium Products Corp. 103
Martin, Glenn L., Co., Inc. ..... —
Maryland Cork Co. ..... —
McKinnon Iron Works Co. 97
McNeil Machine & Engineering Co. ..... —
Monsanto Chemical Co. 15
Mt. Vernon-Woodbury Mills, Inc. 112
Muehlstein, H., & Co., Inc. 83
Mumper, James F., Co. 112

N

National-Erie Corp. ..... —
National Rosin Oil Products, Inc. 109
National Rubber Machinery Co. ..... —
National Sheradizing & Machine Co. 111
National-Standard Co. 87
Naugatuck Chemical, U. S. Rubber Co. 38
Neville Co. ..... —
New Jersey Zinc Co. 10

O

Olin, R. R., Laboratories 112

P

Parsons Engineering Corp. ..... —
Pennsylvania Industrial Chemical Corp. 19
Pequanoc Rubber Co. 110
Phillips Petroleum Co. 4
Pittsburgh Plate Glass Co., Columbia Chemical Div. 23
Pratt & Whitney, Division Niles-Bement-Pond Co. ..... —
Preventive Maintenance Co. 109
Procter & Gamble ..... —

R

Rand Rubber Co. ..... —
Randall, Frank E., Co. ..... —
Rare Metal Products Co. 109
Research Engineering Co. ..... —
Richardson, Sid, Carbon Co. 118
Robertson, John, Co. 14
Rohm & Haas Company, Resinous Products Div. 99
Rotex Rubber Company, Inc. 110
Royle, John, & Sons 91
Rubber Corp. of America, Latex Div. ..... —

S

St. Joseph Lead Co. ..... —
Schulman, A., Inc. ..... Inside Back Cover
Scott Testers, Inc. 109
Sharples Chemicals Inc. ..... —
Shaw, Francis, & Co., Ltd. 95
Shell Chemical Corp. 29
Shell Oil Co., Inc. ..... —
Simplex Cloth Cutting Machine Co., Inc. .. 89
Sindar Corp. ..... —
Sivon Machine Co. ..... —
Skelly Oil Co., Solvents Div. 6
Skelton, Sleat & Co., Ltd. 89
Snell, Foster D., Inc. 112
South Asia Corp. 105
Southeastern Clay Co. 101
Southern Clays, Inc. ..... —
Spadone Machine Co. 95
Stamford Rubber Supply Co. 99
Stanley Chemical Co. 96
Stanley Electric Tool Div. ..... —
Stauffer Chemical Co. 21
Stein, Hall & Co., Inc. ..... —
Stoner's Ink Co. 109
Sun Oil Co. ..... —
Synvar Corporation 97

T

Tanney-Costello, Inc. ..... —
Taylor Instrument Companies 20
Testworth Laboratories, Inc. 105
Textile Proofers, Inc. 103
Thropp, Wm. R., & Sons 91
Titanium Pigment Corp. ..... —
Trade News Service ..... —
Tri-Homo Corp. 94
Turner Halsey Co. 112

U

Union Carbide & Carbon Corp. ..... —
Union Pacific Railroad ..... —
United Carbon Co. ..... Insert Following 26
United Engineering & Foundry Co. ..... —
United Rubber Machinery Exchange ..... —
Utility Mfg. Co. 93

V

Vanderbilt, R. T., Co. ..... Front Cover

W

Weston Electrical Instrument Corp. ..... —
White, J. J., Products Co. ..... —
Williams, C. K., & Co. 117
Wilson, Charles T., Co., Inc. 107
Witco Chemical Co. 8
Wood, R. D., Co. ..... —

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